



This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

- + *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.
- + *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.
- + *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.
- + *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at <http://books.google.com/>



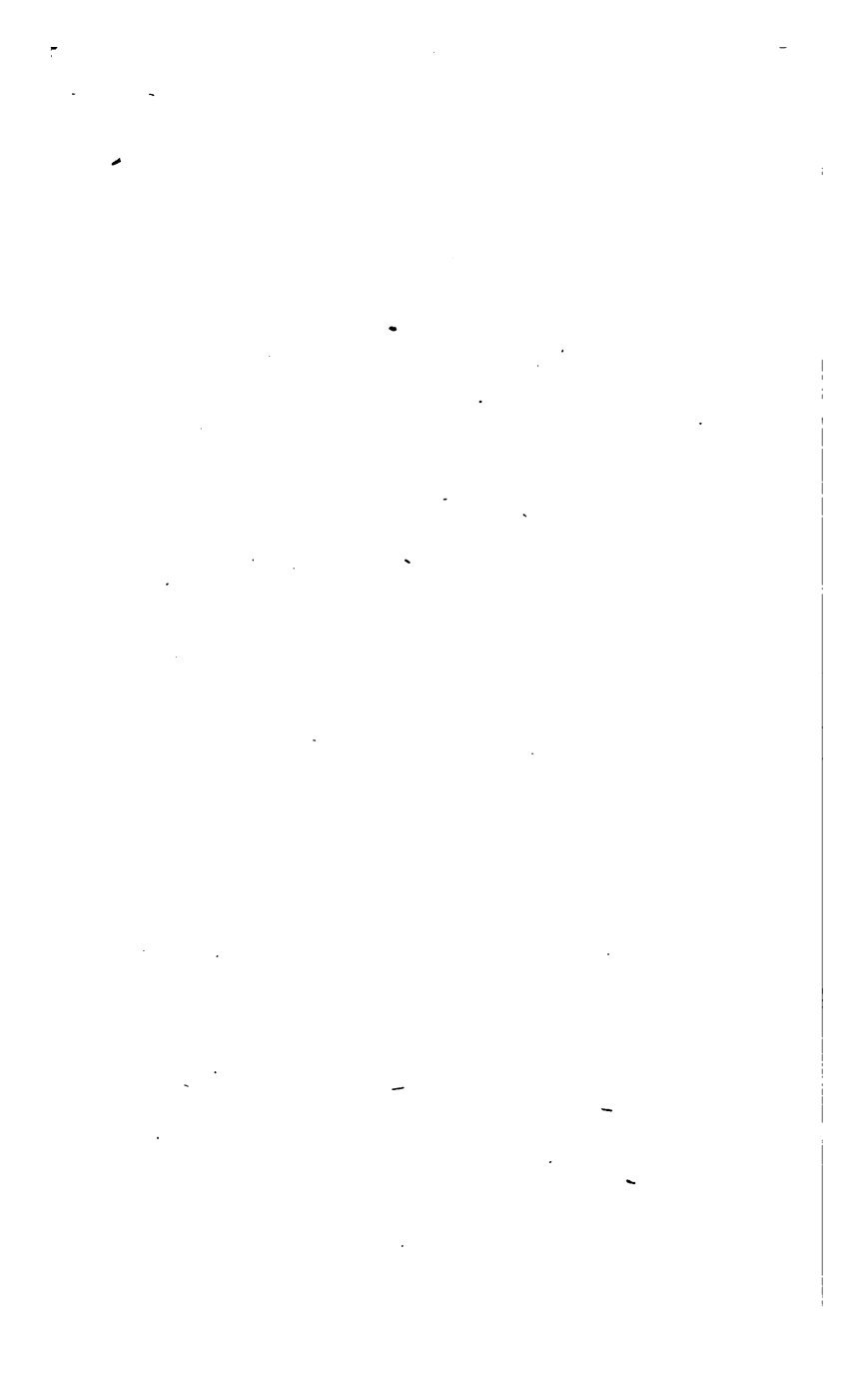
6000304411



1891 e. 307







AN
ESSAY
ON THE
PHILOSOPHY, &c.
OF
NATURAL HISTORY.

THE
HISTORY
OF
THE
CITY OF
LONDON
FROM
THE
FIFTH
CENTURY
TO
THE
PRESENT
TIME
BY
J. H. COLEMAN

J. MOYES, PRINTER,
Greville Street, Hatton Garden, London.

AN
ESSAY
ON THE
PHILOSOPHY,
STUDY, AND USE
OF
NATURAL HISTORY.

BY
CHARLES FOTHERGILL.

"Happy the man, who, studying Nature's laws,
Through known effects can trace the secret cause."

DRYDEN'S *Virgil*.

LONDON:
PRINTED FOR WHITE, COCHRANE, AND CO.
FLEET STREET.
1813.



CONTENTS.

	Page
<i>Dedication</i>	ix
<i>Preface</i>	xv

CHAP. I.

<i>On the General Nature of the Pursuit ; and its Effects on Individuals, and to Society at large</i>	1
---	---

CHAP. II.

<i>A mere Acquaintance with the proper Technical Terms, and a Knowledge of Scientific Arrangement, not the true and most important Objects of this Study. A milder and more noble View of the Subject. Of the Elements</i>	17
--	----

CHAP. III.

<i>The Animal Kingdom capable of exciting the most In- terest. On the Nature of Animals. Objections to Buffon's System. A Definition of the Mental Fa- culties</i>	33
--	----

CHAP. IV.

<i>Illustrations to prove the Truth of what has been advanced in the preceding Chapter, in respect to the Mental Capacities of what are termed the Inferior Animals.....</i>	60
--	----

CHAP. V.

<i>Some important Reflexions, arising from a Consideration of the Nature of Animals. On the State of Man. His Free Agency. Predestination. The Doctrines of Chance. Atheism.....</i>	88
--	----

CHAP. VI.

<i>On the Extent of Man's Dominion over animated Nature, and of the Caution he ought to observe against abusing his Power. On the Sense of Pain in inferior Animals</i>	107
---	-----

CHAP. VII.

<i>Man considered as the Vicegerent of God upon Earth. Some of his Duties connected with a Knowledge of the Nature of Animals. How far Inferior Creatures have been created for the Use of Man. On the Relations which Animals bear to each other, and the Checks which restrain their Numbers within due Limits.....</i>	127
---	-----

CONTENTS.

vii

Page

CHAP. VIII.

On the Utility of different Animals in the Creation. Locusts. Mosquitoes. Ostrich. Hints to explain the Principle of Action in these Animals, which, having no Responsibility, can have no blame 147

CHAP. IX.

Further Observations on the Utility of Animals ; illustrated by more familiar and obvious Instances. Of the Swallow. Common Earth-worms, Viper, and Toad. The smallest and weakest of Animals are of infinite Importance 174

CHAP. X.

A few Remarks on the Abstract Principle of Pleasure and Pain, as it Affects or Governs some Part of the Animal World 198

CHAP. XI.

Of the Change of Matter that is continually taking place throughout the Animal, Vegetable, and Mineral Kingdoms 215

CHAP. XII.

Conclusion, and Recapitulation 231

DEDICATION.

TO

JAMES FORBES, ESQ.

**FELLOW OF THE ROYAL AND ANTIQUARIAN SOCIETIES
OF LONDON, AND MEMBER OF THE ARCADIAN
SOCIETY AT ROME.**

IF I was asked what were my motives for dedicating this little Work to you, my very dear relative, and early friend, I could only reply, that I am anxious to pay some lasting tribute of respect to the character of one who has contributed, more than any of my own particular friends, to the encourage-

ment, and progress, of those delightful pursuits which have filled up many of the happiest hours of my life, and whose interests this little Essay is intended to advance.

It is not to proclaim virtues which have long been known and felt through a widely extended circle of society;—it is not to panegyrize talents that have already secured a large portion of public regard; nor is it for any base purpose of flattery, that I approach you with this little offering;—no! —I have inscribed this volume to your name, because I am acquainted with no one who is better able to appreciate the value of the doctrines it would inculcate;—with no one who is more solicitous for the general cultivation and improvement of the study of *Natural History* in this country;—and with no one who is more sincere, hum-

ble, and devout, in his worship of that GREAT, ALMIGHTY, UNIVERSAL, PARENT, with whose wisdom and power, as displayed in the works of creation, it should be the business of our lives to become acquainted.

From the earliest years, you have, yourself, been attached to the fascinating pursuits of natural science; and you have cultivated them with the most ample success, in regions of the world far more interesting to the present state of philosophy, because less known, than any of those it has hitherto been my fortune to visit; and I am rejoiced to find that the public are so soon to have an opportunity of judging with what effect the valuable hours of your leisure, during a long residence in the East, have been employed.

To none, therefore, can I dedicate a little volume of this nature with greater pro-

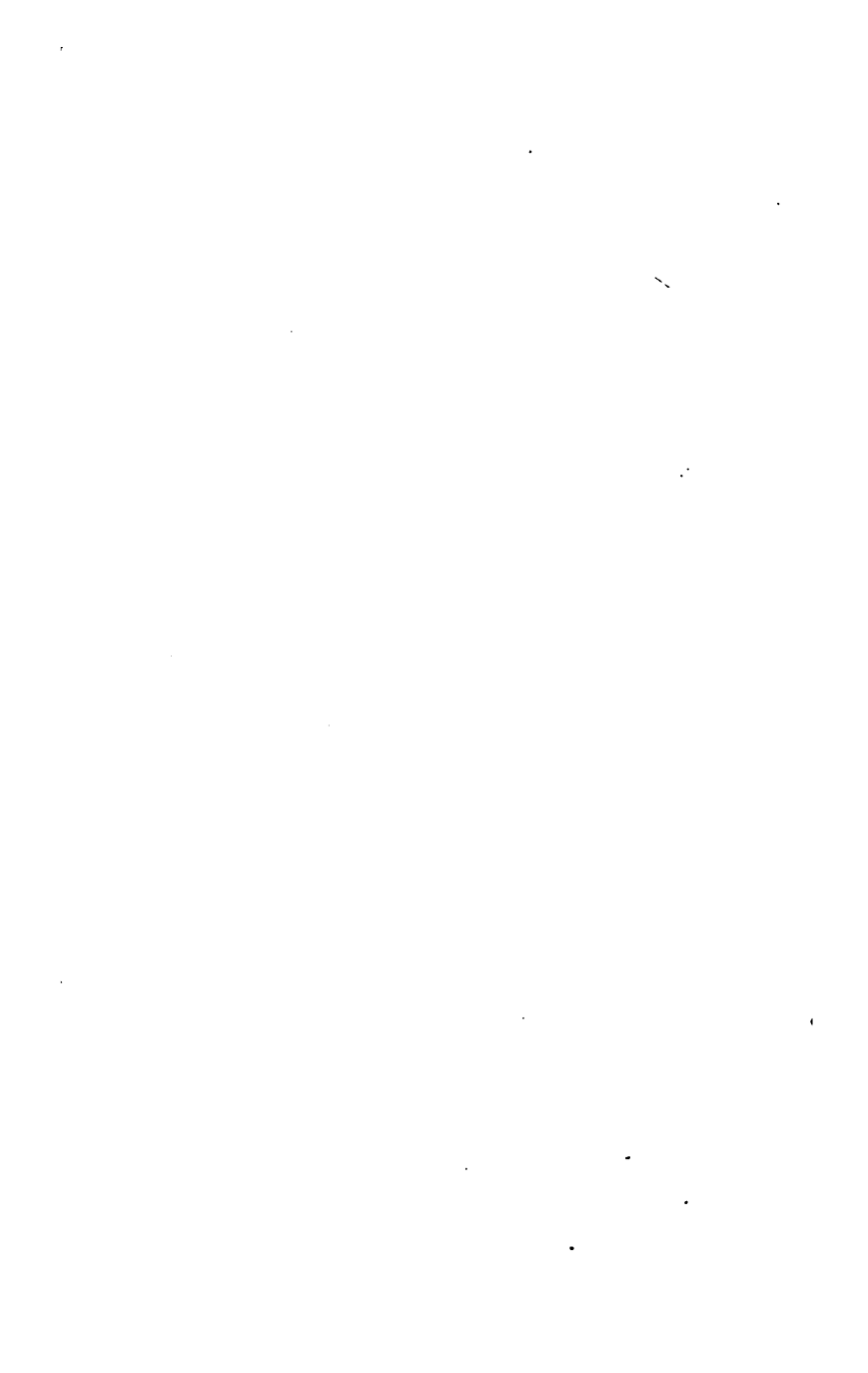
priety, than to one who is already acquainted with the importance of the study on which it treats, and who is ardently desirous of seeing it more generally cultivated. Receive it, then, as an humble attempt to illustrate some new and grand views of the operations of Nature, and of the designs of the GREAT FIRST CAUSE, that have lately opened upon my studies ; and which, I believe, are capable of an extraordinary and interesting developement. Receive it also as a small tribute of my love and respect for the character of one to whom I am indebted for a thousand kindnesses and benefits, which can neither be enumerated, nor properly acknowledged, on an occasion like this, but which are deeply engraven upon my heart.

Farewell :—and, that you may long continue to be the ornament of your own

particular circle of society, by the display
of your fine talents, and the exercise of
your many rare virtues, is the ardent wish,
and the sincere prayer, of

Your affectionate Nephew,

CHARLES FOTHERGILL.



PREFACE.

As the following Essay does not contain so complete a dissertation on the subject as some persons might be inclined to expect from the title, it is necessary to state the reasons which have induced me to publish it under the disadvantage of conscious imperfections.

Having been engaged for many years in studies connected with the Natural History, and especially with the Zoology, of Great Britain; I lately quitted my retirement in the country, for a temporary residence in London, in order to arrange the numerous papers, containing the results of my researches on these subjects, for

publication; previous to my departure from England on a distant voyage.

Finding a number of anecdotes and remarks amongst these manuscripts tending to illustrate some important truths in Natural Philosophy, and to develope many of those secret and mysterious laws by which some parts of the animal creation are governed, that could not be introduced with propriety into any of the series of works I am at present engaged in preparing for the press*, but which I conceived to be of too

* The works alluded to, are some undertakings of considerable magnitude, which have occupied the attention of the author for several years. They will form publications entirely independent of each other, though the whole are composed of materials originally intended for one great work; the design of which has been abandoned through necessity, rather than inclination. That which is at present in the state of most forwardness, is entitled "*Memoirs and Illustrations of British Zoology*," containing the result of personal research into the lives, economy, and uses, of such genera and species of animals as are the least known or understood throughout

much importance to be entirely thrown aside, I resolved to give them publicity in the present form, in the hope that they might not only have the effect of stimulating others to engage in researches that merit the highest estimation, and which are not less delightful to the inquirer than they are important to society; but that they might haply engage persons more able than myself to pursue those curious and peculiar speculations, on the nature of animals, to which it will be found I have so frequently alluded, to that complete and successful developement I am persuaded they must finally attain, if the necessary talents, application, and ardour of research, are employed in the service.

England, Scotland, and Wales; illustrated by the most accurate representations of many rare subjects, not hitherto figured in any work extant. The second will comprehend a general view of the "*Northern Isles of Britain*," both as to their natural advantages, and political consequence. And the third will contain, "*Collections made towards the Natural and Civil History of Yorkshire*."

I am not aware that any work has been written for the express purpose of awakening general attention to what may be considered the higher objects of the study of *Natural History*, though such a work could scarcely fail of proving highly beneficial. SMELLIE, the very able and judicious translator of BUFFON, hath left us some valuable remarks in this branch of philosophy; and DR. SKRIMSHIRE, lately President of the *Natural History Society* of Edinburgh, has written a series of Essays, which he calls "*Introductory to the Study, &c.*" But nothing seems to have been attempted likely to produce a general or powerful effect on the public mind; which is the more to be regretted at a time when so much attention is paid to mere scientific arrangement. A well regulated system, and appropriate technical terms, are very necessary towards the perfection of the science; and the architect, who would build a lofty and magnificent edifice, must not be ignorant of his tools, nor unprovided with suitable

scaffolding. But the end must not be forgotten by too long a disputation on the means of attaining it: the skeleton is necessary for the support of the body; but, what are the dry bones of the valley in comparison with a living, comprehensive, and immortal soul?

The two small volumes of DR. SKRIMSHIRE may be very useful to the *youth of both sexes*, as introductory to the science; and, in this view, they appear sufficiently clear and appropriate: yet, his remarks are common-place, and his genius does not seem of that bold and original cast which is likely to lift up the veil of Nature any higher than his predecessors have done. In his first Essay he makes some correct observations on the utility of the study, and alludes to familiar illustrations; but he gives us nothing new, his mind is content with walking in paths that are safe, because they have already been explored; and he seems willing to leave the vast and

unknown regions of unpenetrated knowledge for more enterprising and more daring spirits.

Such productions as RAY's *Wisdom of God in the Works of Creation* ; DERHAM's *Physico Theology* ; and PALEY's *Natural Theology* ; approach nearer to that character which is likely to produce grand and comprehensive views of the natural world, the various functions of animals, and their relations one to another ; together with the duties of man in the creation, as supreme over all ; than any of the works written on what is called *Natural History*, alone ; and they are consequently productive of far more general good to society. Since it is the professed object of all enlightened Naturalists to seek a more intimate acquaintance with the DEITY, by studying His works, and to gain more accurate and enlarged views of the nature of existence, and all visible objects, by such an employment of their time ; it is surprising that mere system-makers, and com-

pilars of dictionaries, should obtain the character of *Naturalists*.

Under feelings of this nature I have felt it my duty to say something of the pursuit in general, comprehended in wider limits than it may have been hitherto surveyed; as well in respect to the variety of objects it regards, as to its real importance to the best interests of mankind, and as a source of rational and very superior amusement; since it would ill become one who has been accustomed to consider every hour that is not appropriated to profitable thinking, or useful exertion, as lost or mispent, silently to pass over an opportunity of pointing out the value and interest of a branch of knowledge, perhaps, of all others, the most fascinating. Particularly, too, at a juncture when I am about to lay the result of many years' inquiry into subjects of this nature before the tribunal of the public.

The desire of putting forth this little Essay, imperfect as it is, has been more strongly felt

from the consideration, that in this country, at least, the study of *Natural History* has never been either so fashionable, or so much encouraged, as it deserves to be, amongst a people so justly celebrated for the perfection to which they have carried most of the arts, and sciences, cultivated by civilized man. I know that a few individuals have risen up amongst us, whose fame in this branch of philosophy has been established on solid grounds; and I also know, that the pursuit is partially cultivated in most parts of the empire; but, in a general view, it has never been admitted to hold rank with what are deemed the higher sciences in this country; nay, it has frequently happened that its most distinguished advocates have been stigmatized as persons of weak intellects, or have suffered the opprobrium that is generally cast on persons of perverted judgment; notwithstanding the truth, that of all the sciences, when considered throughout its widest limits, that of *Natural History* is the

most comprehensive in its nature, and the most beneficial in its effects; for it embraces the knowledge and use of every object that can be rendered cognizable to the eye, or touch, of man, not on the surface of this globe only, but above it, beneath it, within it, around it, and throughout the visible universe: it may, indeed, and without injustice, lay claim to the high character of being the great parent of all other sciences, which have no materials on which to work, or speculate, but such as are gained from the empire of Nature.

There is, indeed, something peculiar in what might be termed the *public character* of England. Almost every thing great and noble, that is accomplished by the extraordinary genius of her people, is performed either by single individuals, often in private life, or by small associations of individuals, unaided by government: and it is often a matter of surprise to foreigners, who, before their visits to this country, have been

familiar with its fame, and with the number, variety, and extent, of its public institutions, and public works, to find, on their arrival, that though the King, and other branches of the Royal Family, may occasionally *permit* their illustrious names to be honoured in their *use* as patrons of undertakings of great public utility, or of national grandeur; yet, neither they, nor the government, encourage the arts, sciences, or literature, on that extensive and magnificent scale which has been the pride, and the boast, of many other of the European nations. A patronage and an encouragement, which, in a peculiar manner, would become the rulers of a great and powerful empire like that of Britain; whose territories, spread out into all the four quarters of the globe, present such grand opportunities, so many noble and almost unlimited fields of inquiry, that their interest and their wealth appear alike inexhaustible.

It often happens that the men best qualified,

both by talents and education, to promote the growth and interests of science, require the kind of patronage to which I allude. Had it not been for the munificence of a *French* monarch, it is more than probable that the world had never seen the most comprehensive and brilliant work on *Natural History*, the labour of one man, that has hitherto appeared. I allude to the writings of the eloquent and justly celebrated COUNT de BUFFON. The same may be said of *Sweden* in respect of LINNEUS; of *Russia* in regard to PALLAS; and, where it could have been least expected, of the *Spanish Court*, in reference to HUMBOLDT, certainly the most accomplished of travellers; whose researches, associated with those of BONPLAND, in *South America*, furnish an astonishing mass of important and valuable information to the present state of science.

Turning again to our own country, it is not easy to conceive what might be effected in geo-

graphical knowledge, and natural philosophy, by a few such men as PALLAS, and HUMBOLDT, sent out under the fullest patronage, and steady support, of government, to investigate those regions of *Asia* and *Africa* with which we are still so imperfectly acquainted, and to which the readiest access, by such means, could be gained and secured. But, alas! we must not venture to indulge reflections of such a nature. The times are unpropitious to the realization of such hopes. "*Nought but lamentable sounds are heard.*" The dogs of war, not yet satiated with human blood, are still howling for more abundant carnage; and *Christians*, with the doctrines of peace in their pockets, and the sword of extirpation in their hands, are not ashamed to mingle the cries of havoc and destruction with the groans of suffering millions!

Amongst the ancients, a few great examples still live in the records of history; and, however superior the moderns may be in regard to the

comforts of private life, and in the possession of more useful knowledge, some of the heroes of antiquity go far beyond them in loftiness of soul, and grandeur of character. I have sometimes thought that many of the foibles, if not the atrocities, of the mighty ALEXANDER, were atoned by the patronage he extended towards the great Father of Philosophy, his famed preceptor, ARISTOTLE, to whom mankind have been indebted for some of the first rudiments of science. The rays of glory which encircle many of the great names of ancient days, though seen through the thick medium of a long lapse of ages, still appear in all their original splendour, and sometimes glance upon our retrospective ken with a brightness rendered more dazzling by comparison with modern actors on the great stage of human life.

There is something of extraordinary greatness in this part of ALEXANDER's character. Ac-

According to Q. CURTIUS, he applied himself to the study of Nature, not merely because the pursuit was worthy of a superior, and a capacious mind; but because, in his opinion, it was necessary for the emperor of the whole earth to make himself acquainted with its various products. Hence it was that he cultivated this study with the greater application, as the views of universal empire, and the fulness of his future glory, opened upon his ambitious soul.

ALEXANDER not only encouraged, but did himself pursue, the study of *Natural History* upon a scale, and at an expense, commensurate with his greatness, and the magnificence of his character. He commanded all those who obtained their subsistence by hunting, fowling, or fishing, throughout the provinces of *Greece*, and all *Asia*, and also those who had attained any skill in knowledge of this kind, to be obedient to ARISTOTLE, and bring to him any curious result.

of their avocations, or their labours; in order that the Philosopher might be qualified to treat with accuracy on the real nature of animals. Besides which, he allowed that great man the sum of *eight hundred talents** to defray the expense of his undertaking. So attached, indeed, was he to this pursuit, that he lavished extraordinary sums of money in attempts to ascertain what could scarcely be deemed adequate to the cost and trouble:—more than an hundred years after his death, the huntsmen of *Asia* were astonished at the spectacle of wild deer in their forests adorned with the golden chains which had been placed round their necks by the Macedonian hero, in order to ascertain the longevity of those animals.

* According to ROLLIN, 800 attic talents of gold must have amounted to a sum exceeding *two millions* sterling of our money!

The consequences of this extraordinary attention and liberality manifested themselves in the immortal works of ARISTOTLE, which became of such general utility, and importance, that, as SMELLIE* has justly observed, "to this hour, no systematic view of animated beings has been attempted, the principles of which have not been adopted from ARISTOTLE's history of animals."

Such actions must appear more brilliant from a consideration of the period of the world in which they were performed. In times more propitious, how few are the examples that will bear any comparison with them, even amongst those endeavouring after similar fame! After all the parade and boastings of the splendid, and extraordinary, the sensible, and profligate CATHE-

* See his Preface to BUFFON's *Natural History*, General and Particular.

KING of *Russia*, in regard to her patronage of the excellent and learned **PALLAS**, it is notorious that he finally suffered a kind of honourable banishment, by being obliged to draw out the remnant of his days in the unwholesome marshes of the *Crimea* *.

* From aspersions of this nature, *France*, alone, seems to claim an honourable exception. I mean as to great *national* undertakings of a literary or scientific kind. I have just seen a work recently issued from the Imperial press at *Paris*, under the immediate patronage and inspection of the extraordinary **NAPOLEON BUONAPARTE**, entitled, “*Description de l’Egypte, ou Recueil des Observations et des Recherches qui ont été faites en Egypte, &c. &c. Par les ordres de sa Majesté l’Empereur Napoléon le Grand : à Paris, de l’Imprimerie Impériale. M.D.CCC.IX.*” A work which far transcends, in the magnificent style of its execution, any thing before seen in Europe. It is indeed worthy of the *savans* its authors. The circumstance of a numerous army being accompanied, as was that of the French in *Egypt*, by a body of learned men and philosophers, was indeed a singular and an extraordinary spectacle!

Kings and princes of the present day are indifferent, or generally unmindful, of an indisputable truth, “ that learning will always flourish most where the amplest rewards are proposed for the industry of the learned; and that the most shining periods in the annals of literature, are the reigns of wise and liberal princes, who know that fine writers are the oracles of the world, from whose testimony every king, statesman, and hero, must expect the censure or approbation of posterity. In the old states of *Greece* the highest honours were given to poets, philosophers, and orators; and a single city (as an eminent writer* observes), in the memory of one man, produced more numerous and splendid monuments of human genius, than most other nations have afforded in a course of ages †.” It was in the true spirit of this opinion that ALEXANDER was

* ASCHAM.

† JONES’s Preface to his *Persian Grammar*.

accustomed to esteem Achilles as one of the happiest of men, because it had been his good fortune to have HOMER for the historian of his virtues*.

But let me not talk of patronage till I am forgetful of the subject that would humbly claim

* Having found a most curious casket, both for the materials and workmanship, amongst the plunder of *Damascus*, and his friends having asked him for what use it should be reserved, ALEXANDER replied, " We will dedicate it to HOMER, since it is but reasonable that the most precious monument of human wit should be preserved in the finest piece of workmanship." Hence the most correct edition of that poet, which ALEXANDER was at much pains to get, was called the "*Edition of the casket*," because in that casket the *Persians* had kept their most precious perfumes. One day, as a certain messenger of good news ran towards him, in all haste stretching out his right hand, with marks of the highest joy in his countenance; "*What news can you tell me,*" said he, "*that is worthy of so much joy, unless that HOMER is alive again?*"—Q. CURTIUS.

it. To impart wisdom, and to inculcate virtue, are the dearest and most delightful employments of great and good minds; but knowledge must be acquired before it can be communicated; and, if I have failed of being sufficiently clear and elaborate in the elucidation of some doctrines that may be novel to many readers; or, if it shall be found that I have given mere hints, where satisfactory detail should have appeared, I wish all such deficiencies to be imputed to a fear of going beyond the authority of facts; and to a want of leisure that is most painfully felt, and which, at present, deprives me of the power of rendering this Essay of greater consequence. Such as it is, I offer it to the acceptance of a thinking, an indulgent, and an enlightened public, till something of the kind, more worthy of general patronage, shall appear; and, if a single ardent and comprehensive mind is induced, by a perusal of this little book, to engage in those pure and

exalted studies of which it treats, I shall not only account myself happy, but I shall deem the reward far more than adequate to the labour bestowed.



An Essay
ON THE .
PHILOSOPHY
OF
NATURAL HISTORY.

CHAP. I.

On the general Nature of the Pursuit ; and its Effects on
Individuals, and to Society at large.

SUCH is the nature of human existence ;
so gradual are the unfoldings of mental
power, as the infant grows into manhood ;
and, by such imperceptible degrees are all
the visible objects of creation fully per-
ceived by man, that he is not so forcibly
struck by the exquisite beauty, and the as-
tonishing wonders, of the globe which an
OMNIPOTENT BEING, the great Architect

of the universe, hath allotted to him for an inheritance—as he must necessarily have been, had it pleased the same Almighty Power to drop him suddenly upon this earth, with all his faculties about him, clear and undismayed.

It is difficult to conceive the excess of ardent curiosity with which a man so situated would survey all the variety of natural objects by which he was surrounded; for he would immediately perceive, that not only all his comforts, but the very means of supporting his existence, must depend upon his knowledge of their properties and uses, and upon the extent of his dominion over them; he would feel assured, that to study them, and become intimately acquainted with their nature, was the first and most important of his duties. He would find his pleasures also dependent on the same external objects. Whatever could delight the eye, or gratify the ear:—the azure canopy of heaven, spread out by night with countless myriads of stars, and by day illumined with the sun's resplendent beams;

the delightful verdure of the green earth, speckled with innumerable flowers, and adorned by groups of living, locomotive, beings, of every variety of conformation, and almost every degree of mental intelligence, from himself downwards;—the solemn stillness of the woods; the sublimity and rude magnificence of the mountains; the expanse of the boundless deep; the balmy freshness of the morning; and the sweet melody of the birds;—to man, in his state of innocence, would afford themes of continual joy.

Such, however, is the general effect of a long acquaintance with the scenes of Nature, that, although possessing the highest interest, they cease to have any influence on ordinary minds when their novelty has passed away; and, generally, they are least valued by those to whom they are most frequently presented. Man is very frail, indolent, and ungrateful. Blessings uniformly continued, and constantly enjoyed, are considered as rights; and, as rights long established, they are confidently expected,

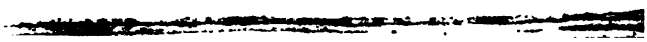
and carelessly received. The benefits derived from the light and heat of the sun are inestimable; and wonderful and all-powerful is that energy which is capable of upholding its everlasting continuance; yet, that this glorious luminary should lighten the earth, and by its genial warmth awaken, preserve, and invigorate, the animal and vegetable creation, is so much a matter of course, excites so little emotion, and is acknowledged with so much indifference; that should any one, warm from a serious contemplation of its ever-active and beneficial influence, venture to pour forth the effusions of his admiring soul before the generality of men — the stare of astonishment, or the smile of contempt, would soon convince him that he felt alone.

But, whatever opinions may be held of such an employment of time as that which is occupied in the investigation of natural objects, it is quite certain that every thing subjected to the use or pleasure of man, depends immediately, or remotely, upon this knowledge: as such, it is worthy of our

most serious attention ; and it becomes necessary to examine the nature, and, as far as possible, the limits, of the field subjected to our inquiry.

One who aspires to the knowledge of every department into which the vast and noble science of *Natural History* has been separated, when called upon to declare the objects of his pursuit, and what are the benefits likely to accrue to those individuals who engage in it, and to society at large, might thus briefly, and yet comprehensively, define them.

To trace the footsteps of God, the eternal, the infinite, the omniscient, and omnipotent, throughout all Nature ;—to be initiated in mysteries and laws which produce effects that are necessary for our welfare, or that conduce to our happiness ;—to seek the knowledge of *His* designs, and of *His* works, to the end that we might more properly appreciate the various objects, both animated and inanimated, by which we are surrounded ; and to regulate our duties and our pleasures by that knowledge ; he would



say, was the high mark and calling to which his talents and his labours were directed.

Though the empire of Nature has been elegantly and comprehensively defined to consist of all the heavenly bodies; the stars, both fixed and revolutionary; the elements, and the earth;—indeed of every species and every combination of matter that is contained within the vast and unknown limits of the universe: yet it is to the globe upon which we tread, that the attention of the *Naturalist* is properly, and more immediately, directed. It is here that the grand field for inquiry is opened to his view; because it is here only he can expect to come into that personal contact with the various forms and combinations of matter which can yield any certain or useful knowledge. This globe, therefore, with all that it contains, together with the circumambient air, may be termed his own immediate empire; and, for the sake of perspicuity, it is divided into what are termed the animal, vegetable, and mineral kingdoms.

Animals derive their support from vege-

tables, or by lessening the numbers of each other when too abundant;—vegetables from earthy substances, and earthy substances from the earth itself;—all by the assistance of the elements of fire, air, and water *, without whose aid there can be neither life nor motion.

Every thing that exists upon, or is contained within, this globe, is dependent upon it for support, and has no apparent connexion with any other world. Let us therefore look to its constituent parts, and mark their mutual dependencies; by which our ideas of the wonderful contrivance, the infinite wisdom, and unlimited power, of *Him* whose hand stayeth it in the heavens, as another spangle in the starry mantle of the universe, may be expanded and exalted, even to the height of this great subject.

* I am aware that *air* and *water* are no longer considered as simple elements by the ablest chymists of the present day; but, in the general view I am now taking, no misconceptions can arise from regarding them as such; since I merely wish, on the present occasion, to mark the agency of those fluids.




Minerals are such concreted bodies, without either life or feeling, as constitute the form and substance of this globe:—vegetables have organization and life; but, apparently, no feeling, and they clothe the earth:—animals are organized, living, sensitive, intelligent, locomotive, bodies that adorn, cultivate, and consume the produce of the earth. Every possible form or combination of matter to be found in or upon this globe may be placed in one or other of these three general divisions, or *kingdoms*, whilst in its original or natural state; and, to facilitate the acquisition of knowledge, and to apply it without confusion, these have again been separated into the necessary classes, orders, genera, and species.

It is not, however, in a mere acquaintance with the proper names of objects, nor in their correct classification, that any one ambitious of the name and character of a *Naturalist* can for a moment rest satisfied. Artificial signs may serve as useful and necessary distinctions, but they can never be

the things they represent; nor can they ever propound any law, or teach any useful principle. The enlightened student of Nature will regard truth more than symbols; things, themselves, more than names; and the utility of objects, more than the peculiarities of their external forms.

From Man, whom it has pleased the ALMIGHTY GOD to endow with his own image and to bless with a portion of his own divine light, granting him also pre-eminence over the rest of *His* works, does an enlarged view of this science descend, by easy and regular gradations, down to the smallest particle of existing matter.

Such is the almost boundless extent which the true *Naturalist* wishes to grasp, and such are the objects whose design, qualities, and use, he seeks to comprehend; that his own mind, at every step, may be enlarged, elevated, refined, and filled with the power of wisdom; and that mankind, by his labours, and by his discoveries, may be improved in their condition, and obtain new sources of happiness; proving, that as



all knowledge comes from God, so must that knowledge be derived through an acquaintance with his glorious works.

Without particularizing the obligations of man, civilized or barbarous, it may be asked, What does he not owe to the cultivation of this most necessary and valuable knowledge? Let him first consider those things without which he could not exist; food and raiment! Let him take a view of the materials of art, and of what they consist! Let him remember in what manner those commodities which constitute, or occasion, the commerce of nations, and its consequent advantages, were discovered, appreciated, and procured! Let him thus employ his mind, but for a few moments, and he must find that it was to an examination and knowledge of natural bodies, and their qualities, that man was originally, and now is, indebted for all the comfort, all the wealth, all the refinements, and all the outward enjoyments in his possession: and are we to suppose, for a single moment, that every region of Nature has been ex-

hausted of its stores?—do we imagine that the earth has been already deprived of her wealth, or that her vast and fruitful womb has at length become barren?—can we believe that no more vegetable productions are to be found, by whose virtues the diseases incident to the human frame may be removed or alleviated, or by the use of which our comforts may be heightened and increased?—and can we believe that no animal remains to be discovered within the compass of this green earth, whose properties shall be found of valuable consequence to our species?—Has our knowledge arrived at such an acme of perfection?—Surely not!

Since, then, mankind have already been so much benefited by the labours of the industrious and enlightened examiners of Nature, even from the savage who is employed in his native bog, or upon his lonely and inhospitable waste, in the search of plants to cure his maladies, or of roots and animals to satiate the cravings of his imperious appetite; up to civilized man, engaged theoretically, and experimentally, on

the best means of promoting discoveries likely to prove valuable to art or science; these pursuits must continue to be not only exceedingly interesting, delightful, and honourable, to those who are employed in them, but they must also prove highly beneficial to society.

Let, therefore, no vain attempt to cast ridicule on such a study be heard within the precincts of any circle or condition of people making pretensions to the civilized character. There are, indeed, some unfortunate persons who can be interested only by such pursuits as gratify the senses; who, in the choice of their pleasures, are influenced entirely by their meaner passions; and who can approve no other amusements than those which have obtained the sanction of fashion, or which happen to be congenial with their profligate habits. To such men the study of *Natural History* must indeed be insipid, and to them without any charms. But the yawn of a fool is no argument; his dislike is no refutation; his stupidity is no disproof. The volume of

Nature is opened only to the heart that is uncorrupted, and to the mind which is unsophisticated:—to the luxurious sensualist; to the sordid wretch who thirsts for gold alone; to the silly and indolent coxcomb; and to the vain and fickle children of ever-varying fashion; it is as a treasure that is hermetically sealed; and all that is vast and comprehensive in design, all that is excellent in contrivance, all that is admirable in arrangement, and all that is beautiful or interesting in united simplicity and grandeur, in the widely extended scenes around them, is for ever hid from their darkened vision. They have ears, and do not hear; they have eyes, and do not see.

In the middle ages, it is true, the study of Nature was first treated with contempt; then aspersed as wholly unattainable, and its votaries persecuted, or punished, as persons connected with some infernal power. This may be believed of ages dark and barbarous, as were those which slowly rolled over the melancholy reign of the Monks; but, that a science so comprehensive and beneficial,

should now be considered as light, vain, or frivolous, is scarcely to be credited ; since, even from an examination of the humblest flower of the field, lessons of wisdom may be gained ; in attending to the structure of its various parts, in beholding the internal arrangement, in investigating the causes and manner of its growth, and in finding the uses to which it may be applied, something of importance to the business of life may be learnt.

But, above all the individual considerations which might be urged, something ought surely to be said of the happy effects produced on the minds of those who are employed in the cultivation of *Natural History*. They become expanded, cheerful, raised, refined, and benevolent, in degrees proportioned to the extent, and the application, of their researches : nor can we have occasion to ask the cause of such pleasing results, when it is considered that, of all the sciences, this brings her votaries to a nearer approach, and to a closer intimacy with Nature's God, and shows them that *His* majesty, beauty,

power, and glory, dwell in every place, and abide on every, even the minutest, atom of existing matter. Thus, while the study of many other sciences is found to occasion frigid systems of philosophy, melancholy views of life, and, too often, infidelity, with all her black train of evils;—the study of *Natural History* is not only productive of incalculable advantages to mankind in general, if rightly pursued, but, to the virtuous mind, such a degree of wisdom, power, and happiness, as can only be exceeded by an emancipation from the shackles and the thick veil of mortality, and an admission into those regions where wisdom is perfected, and bliss is eternal.

With those, therefore, who assert that studies of this nature can have little interest, and are of no real importance, the honestly ambitious can wish to have no fellowship. For the approbation of such persons, surely no wise or good man can be solicitous. Life is capable of other enjoyments than those which merely contribute to its support, or to the pleasures of sense;

else, in what are we different from, or superior to, all the meaner animals; who have the power to obtain subsistence, with less than half the labour of man? Whatever is capable of drawing our attention to a better estimate of human life, and can enable us to raise our thoughts above the grovelling pursuits of mere animals, exalts our dignity, and gives refinement to our enjoyments!

CHAP. II.

A mere Acquaintance with the proper Technical Terms, and
a Knowledge of Scientific Arrangement, not the true and
most important Objects of this Study. A milder and more
noble View of the Subject. Of the Elements.

THOSE who pursue this science merely
with a view to be able to distinguish one
natural body from another; who, when they
have made themselves masters of the *nomenclature*, of the technical language, of the
science, conceive they have attained all that
is necessary, and are willing to rest satisfied
with such barren information—are really
deserving of all the ridicule that could be
heaped upon them. Pedantry so idle and
absurd, is one of the legitimate objects of
satire; and I will make no attempt to in-
terpose a shield of defence. As well might
a mechanic rest satisfied with the knowledge
that his tools were called by certain, fixed,
names, and neglect to use them; as a man

of science forget the important objects of his studies in his attention to mere terms. After having learnt the proper names of things, our next consideration should be to discover their properties and use.

In order to obtain correct notions of a vast and magnificent object, it is often necessary for us to remove from it to a certain distance, that our view of its principal character, and general design, by taking the whole in at once, may be the more clear and undivided. After having observed the general plan, by nearer approaches, we can next examine the minor parts, and observe their several beauties, and their relations to each other. He who could wish to form just conceptions of the grandeur and the architectural skill displayed in the church of *St. Peter* at Rome, would neither place himself at the vestibule, nor upon the summit; but would probably wish first to behold it from such a distance as would enable him to survey the whole structure at one view.

Such is our comparative insignificance,

and such the imperfection of our corporeal senses, that we can regard but a very small portion of the surface of this beautiful orb, the earth, at once; though the power of locomotion enables us to visit nearly all its parts. Our attention is, therefore, constantly occupied with its minor parts and the effects of secondary causes; and our vision being occupied by lesser objects, because nearer to us, and the most numerous, is not so easily extended to a general view of the whole creation, and the few grand, yet simple, principles by which it is governed. But it has pleased *Him* from whom we derive our being to bestow a faculty upon us that is not subject to those laws of gravitation which confine our corporeal movements to the surface of the earth. Imagination enables us to soar on eagle pinions beyond the imperfect vision of mortality, even to such a height in the heavens as to exhibit this orb itself, with all its lands, its mountains, and seas, but as a little speck in the midst of interminable space.

I wish neither to be idly rhapsodical, nor

foolishly speculative; but, for the purpose I have in view, I wish to urge a supposition. Let any one for a moment imagine himself so raised above this earth; or, by a yet more daring flight of fancy, let him suppose himself in a situation like that so sublimely painted by MILTON, when *Satan*, after traversing the gloom of chaos, first perceives,

— “fast by, hanging in a golden chain,
This pendent world, in bigness as a star
Of smallest magnitude close by the moon”—

Let him imagine himself gradually approaching the wonderful object before him, as a little bark draws near the shores of some newly discovered country, and see the outlines of rocks, the shadows of mountains, the darkness of woods, the winding course of rivers, the placid surface of lakes, and the rolling billows of the great deep, extended far and wide; and not alone, nor unadorned, these mighty objects: let him contemplate, with ravished eye, ten thousand various coloured hues, and myriads of living, sensitive, moving beings, filling earth, and air,

and water, with emanations of the divine intelligence.

After the powerful emotions created by a spectacle so sublime had subsided into calm admiration, the spectator would naturally inquire into those laws and principles which appeared to regulate, or influence, the various parts of this wonderful system of things, and he would soon perceive that the four elements were the grand and simple agents by which the FRAMER of the UNIVERSE modified, governed, cherished, and preserved, the innumerable forms and combinations of matter, which constitute the animal, vegetable, and mineral kingdoms.

It is at this distance from lesser objects, and from this point, where the great outlines of creation alone are to be scanned, that the *Naturalist*, who wishes to perceive the magnitude of his noble and pre-eminent science, must commence his survey. He must imagine himself standing upon the mountain of the whole earth, from whose lofty summit all the works and plans of

creation may be seen as a map spread out at his feet.

Then will he find fresh springs of instruction, and new fountains of delight, rising in his soul. The beautiful verdure of the green earth, bespangled with flowers; the genial warmth of the summer's sun; the refreshing showers of spring, and the balmy breath of the morning, will have obtained additional charms:—to him they will bring something more than the slight sensations of mere animal pleasure, which they impart to the ignorant, and which the brute also experienceth; for in them he will perceive the operation of those principles, on which his own life, and the existence of all around him, is dependent; and, as he felt that without their aid the whole creation must go back to original chaos, his soul would necessarily be filled with adoration, and bowed down in gratitude, to that DIVINE and OMNIPOTENT BEING from whence these things are derived, and by whom they are sustained.

Here let us pause to take a general view of the elements,—consisting of earth, air, water, and fire,—and the manner in which they operate; and it will soon appear, even to the most hebetated mind, in what manner they influence and govern the various phenomena in creation. I shall begin with the first, as the basis, or general medium, supporting the operations of the rest.

The most ignorant know that *earth*, in various degrees of density or solidity, constitutes the great mass of the globe; and, that the finer parts, near the surface, admit of being modified into vegetable and animal substances;—as such, the earth yields the solid, or more palpable, materials of creation; but, without moisture, matter is incapable of modification, and is wholly sterile and unprofitable.

Water is necessary to the formation of every natural production. It has already been observed that animals depend upon vegetables for their support, and that vegetables are dependent upon the earth. Chemistry, which gives the Naturalist his

proofs by analysis, has shewn that every vegetable substance contains a considerable proportion of water, which may be easily separated from it. It is consequently deducible, that, without water, vegetables cannot exist; and, if they cannot exist, animals must perish. But the manner in which the earth is watered, affords one of the finest subjects for contemplation in Nature.

The boundless ocean, whose billows break on every shore, forms a vast reservoir, that is indispensable to the well-being of the world. From its surface, under the influence of heat, vapours rise up to form clouds, which, being driven by the winds, spread over the whole surface of the earth; and, descending upon the dry land, saturate it, and give origin to the springs, whose waters accumulate into rivers, which, descending from the higher to the lower grounds, spread out into lakes; or finally flow, by various meandering courses, back to the ocean, that grand receptacle from whence they originally proceeded*.

* Something seems to remain for chymists to discover in the nature, and component parts, of water; since, if it be

This natural revolution, because necessary, is constant and regular, and presents a fine illustration of the wisdom and power of the Supreme Being.

Since both plants and animals exist by the laws of respiration, it is evident they must have a continual supply of *air*, or their functions cease, and they die; accordingly we find the whole earth enveloped in an atmosphere so admirably composed, and so wonderfully tempered, that it serves

merely composed of *hydrogen* and *oxygen gas*, how happens it that evaporation does not *constantly* take place by exposure to the atmospherical air? The lapse of thousands of years seems to make little or no impression on the quantities of the ocean. Has the law of gravitation the same influence on watery, as it has on earthy, particles?—I am aware that the celebrated Dr. BLACK has observed, that, if the heat, which at present enlivens and cherishes the earth, were allowed to increase beyond due bounds, water “ would lose its present form, and assume that of an elastic vapour like air.” But, as things now are, the mere *tyro* cannot easily be made to understand why the *artificial* water, composed of *hydrogen* and *oxygen gas*, by the chymist in his laboratory, immediately evaporates when exposed to the atmospherical air, whilst *natural* water retains its character in the same degree of heat, if both be composed of the same materials.

proofs by analysis, has shewn that every vegetable substance contains a considerable proportion of water, which may be easily separated from it. It is consequently deducible, that, without water, vegetables cannot exist; and, if they cannot exist, animals must perish. But the manner in which the earth is watered, affords one of the finest subjects for contemplation in Nature.

The boundless ocean, whose billows break on every shore, forms a vast reservoir, that is indispensable to the well-being of the world. From its surface, under the influence of heat, vapours rise up to form clouds, which, being driven by the winds, spread over the whole surface of the earth; and, descending upon the dry land, saturate it, and give origin to the springs, whose waters accumulate into rivers, which, descending from the higher grounds, spread out into lakes; or, in some cases, by various meandering courses, sink into the ocean, that grand receptacle of all waters, which originally proceeded *.

the vital purposes of every animated form in the creation, however dissimilar its destiny, or its parts; and, whilst some plants and animals return noxious particles for the *oxygen*, or *vital air*, they receive; others counteract this evil, by consuming that which is baneful, and generating wholesome air in its room.

However subtle and mysterious may be the nature of *heat*, it is quite plain, as Dr. BLACK has most beautifully and clearly illustrated in his lectures on this subject, “that not only all animal and vegetable life, but that the whole face and appearance of Nature, the very form and powers of the elements themselves, depend on the limited action of heat”—and its indispensable utility in the business of creation cannot be more clearly shewn than in its influence on water alone, as eloquently described by the same illustrious man:—

“But, in this succession of forms and operations which it undergoes (speaking of water) you will perceive that it is set in motion, and adapted to these ends, by the

nice adjustment and gentle vicissitudes of heat and cold, which attend the returns of day and night, and summer and winter; and that even the *form*, under which it and the other elements play their parts, depends upon the limited action of heat. Were our heat to be diminished, and to continue diminished, to a degree not very far below the ordinary temperature, the water would lose its fluidity, and assume the form of a solid hard body, totally unfit for the numerous purposes which it serves at present. And, if the diminution of heat were to go still farther, the air itself would lose its elasticity, and would be frozen to a solid useless matter like the water; and thus all nature would become a lifeless, silent, and dismal ruin.”—“On the other hand, were the heat which at present cherishes and enlivens this globe, allowed to increase beyond the bounds at present prescribed to it; beside the destruction of all animal and vegetable life, which would be the immediate and inevitable consequence, the water would lose its present form, and assume

that of an elastic vapour like air; the solid parts of the globe would be melted and confounded together, or mixed with the air and water in smoke and vapour; and nature would return to the original chaos*.”

The effects of heat afford an inexhaustible subject for discussion: but it does not form part of my plan, in this general view, to enter largely into it. I cannot avoid remarking one of those effects, however, because of its extensive agency and use in the creation, as giving origin to the winds.

The heat of the sun appears to be the most powerful cause of winds; and, amongst the innumerable beneficial consequences arising from their agency, there is one exceedingly interesting to the Naturalist, as explaining some difficult and very curious phænomena. Besides their utility in preventing the general stagnation, and consequent putridity, of the atmosphere; they are employed in wafting the productions of one country to another, and in clothing

* Lectures on the Elements of Chymistry, vol. i. p. 247.

the earth, even to the otherwise inaccessible heights of rocks and mountains, with vegetation. The seeds of innumerable plants are furnished with wings, and feathery appendages, expressly to qualify them for distant flight by these means. Thus, wherever the smallest accumulation of soil takes place, whether on the craggy summits of mountains, the little chinks and clefts on the sides of rocks and precipices, or even on the tops of lofty edifices raised by man, we perceive attempts made to establish the vegetable kingdom. Myriads of seeds are wafted by these means, in every direction, over the whole surface of the earth and sea, —but those only take root, and spring up, which happen to fall on a spot suited to their growth. Even when subterranean fires break out in the bottom of the ocean, and, by volcanic power, cast up new islands, far distant from any former land, those desolate spots soon become clothed with a vegetable mantle, and their nakedness is no longer terrible to the wandering tribes of animals

which occasionally gather round their shores.

In the middle solitude of the vast Indian Ocean there exists an island of this volcanic origin, at the sublime distance of more than two thousand miles from any other land; which, in remote ages, hath arisen in tremendous noise and combustion from the unknown depths of the sea, and which, from its topmost height, still breathes forth sulphureous vapour, and smoke, and flame. It has been called the *Island of Amsterdam* *. Had BARROW, the well-known and enlightened traveller, been generally acquainted with the *Philosophy of Natural History*, he would not have found himself so much at a loss to account for the clothing of the greater part of this extraordinary island with a rich

* It is surrounded by very lofty and wall-like precipices, and is about twelve miles in circumference; it abounds with hot springs, and is covered with a great variety of plants and animals,—altogether presenting an highly curious and interesting object to the traveller, and the naturalist.

and plentiful vegetation *. He would have immediately perceived that the germs of vegetation must have floated to that solitary spot on the wings of the wind; and, if any doubt of that fact could obtain in his mind, the circumstance of there being no plant so high as a shrub, nor any that could be deemed frutescent, on the whole island; as well as the remarkable fact that the naturalist of the expedition actually collected more than fifteen genera known to be natives of Europe on various parts of its surface; might have removed any such doubt, and confirmed the truth of this hypothesis.

From what has already been observed, some idea may be formed of the amazing extent of the field for investigation opened to an inquiring mind by the subject of heat: and, of all foolish idolaters, or simple worshippers, those who fall down in adoration

* See his Voyage to Cochín-China in the years 1792 and 1793

to the glorious luminary of day, seem to excite the least astonishment, and to have the best reasons to urge for their, apparently, natural system of mythology.

CHAP. III.

The Animal Kingdom capable of exciting the most Interest.

On the Nature of Animals. Objections to BUFFON'S System. A Definition of the Mental Faculties.

AFTER having taken what might justly be termed an *elementary view* of creation, the observer would naturally descend to its parts, and would most probably fix his attention on that grand division of natural objects which, according to his feelings or notions, possessed the most interest, for the first subjects of his investigation; and, that *animals* are more interesting than vegetables, or minerals, there can surely be no doubt; since they alone, of all the works of God, here below, possess any portion of that intelligence, that spiritual existence, which, in an unlimited degree, infinite, and inconceivable, is possessed by *Him* who hath planned, and portioned out, the universe.

Many of the speculations, however, which necessarily result from the study of Man, and Nature, have been productive of painful anxiety, not unmingled with dissatisfaction, even in minds of a very superior cast; and, one long accustomed to the contemplation of the various images, inanimate, as well as animated, by which we are surrounded; not as an idle spectator, whose curiosity is excited by some strange exhibition, as the admiration of a child is drawn forth by new baubles; but, as a philosopher in search of wisdom and truth:—One, so accustomed, might occasion some surprise by asking one of the haughty and ignorant lordlings of creation, strutting along in the broadest sunshine of fortune, in what the much boasted superiority of man, over all the rest of animals, consisted? since it is by no means apparent in the lives and actions of the great mass of the human race, who have either not yet emerged from barbarism, or, who are continually abusing their free-agency, and prostituting its power to the worst purposes. Neither the ignorant, nor

the profligate, who pass through an ephemeral existence in thoughtless vacancy, nor the restless votaries of fashion, who catch at every folly as it floats by them, would find this question of easy, and, at the same time, of satisfactory solution.

The *Natural Philosopher* could easily prove to them that man is greatly excelled in all his bodily powers, and in his external senses, by animals that are called his inferiors. In the faculties of *hearing, seeing, smelling, tasting, and touching*, he is greatly surpassed by many well-known animals; and the instinctive powers of others so nearly approach the reasoning faculty in the human species, that man has occasion to cultivate his mind to the utmost, and to give unequivocal proofs of superiority, in order to determine the question in his favour.

Far be it from the writer of this little Essay, to entertain, or to uphold, any doctrines lessening the true dignity of man, or in anywise contributing to diminish the nobility of his character, and the final glory of his immortal career. But truth is the

only treasure that is worthy our homage, since it alone is omnipotent; and, as it is generally admitted that man owes his proud distinction over all other animals to mental superiority, rather than to bodily strength, it surely behoves him to examine the grounds of that distinction, and to improve the advantages he may discover to the utmost extent of his power, that this pre-eminence may not only remain clear and decided; but, that the dominion, which is given him, may be exercised with due regard to the rights of others.

Of all the subjects for investigation presented to the *Naturalist*, there is none likely to give him so much interest, and I may surely add instruction, as the nature of what has been termed *instinct*; since a minute and careful research into the lives and economy of animals shews that they are really in possession of all the mental faculties found in man, (though seldom or never in equal degree) that of *imagination* alone, perhaps, excepted; and, as we are ignorant of the language, and unacquainted with the

signs, of inferior animals, we can only judge of this want through presumptive evidence. Let no unphilosophical reader startle, or shudder, at remarks so bold, and, as he may think, so unwarrantable; but, rather let him look abroad, and apply to Nature for proofs—abundance of which he can scarcely fail to discover, if his views are impartial, and unclouded by prejudice.

In a discussion of this nature, the immortal part of man, that which ranks him with the children of light, and promises him celestial inheritance, must be left entirely out of the question. The Christian reasoner has nothing to do with *Brahminical*, or *Pythagorean*, doctrines; and, therefore, he can have no desire to admit an immortal fellowship with inferior creatures, however he may be astonished at the powers of mind they severally display; powers admitting such close comparison with his own faculties, that the distinctions are sometimes so faintly marked as scarcely to be perceptible.

When I speak of the *immortal part* of man, I mean, his claims to a superior state

of existence, and to eternal life; *not any intellectual principle distinct from the physical faculties of what is termed mind*, which I believe to be common to all animals having locomotion, and any peculiar destinies to fulfil; though man generally possesses them in higher degree than other animals, and, occasionally, in a supereminent degree above them. But the subject is curious, and worthy our deepest attention, since it must be from investigations of this nature that the designs of OMNIPOTENCE, respecting the animal creation, can at all be penetrated, for DIVINE WISDOM gives nothing in vain;—all things are adapted to their ends;—where faculties are found, corresponding effects must be looked for; and it is clear that the best means of discovering the utility of all animated beings, either in the great scale of creation, or merely to man, are to be obtained by ascertaining the nature and extent of their faculties.

The reasoning upon this subject which the celebrated COUNT de BUFFON has introduced into his dissertation on the

"*Nature of Animals*," appears to me so extremely fallacious, and inconclusive, that I cannot avoid offering some kind of refutation † to those parts which more immediately bear upon the comparative merits in question.

To trace, and to ascertain, the different degrees of mental power which are pos-

* See his Nat. Hist. General and Particular, by Smellie, vol. iii.

† *BURROU* is justly the pride and the boast of French Naturalists: and he is certainly the most splendid, and the most eloquent, as well as the most voluminous and general writer on *Natural History* the world hath yet seen. But his works are so replete with error, that they are dangerous in the hands of young students; who, led away by the brilliancy of his style, and the fascination of his eloquence, forget to exercise the necessary caution in perusing them. This celebrated man had, besides, a great and an unpardonable fault; which was an utter and a general contempt towards the Naturalists of other countries; and especially towards those of Britain. He carried this disdain so far, indeed, that he affected to despise the great LINNEUS, and even wrote a discourse purposely to cast ridicule on that celebrated man, whose name will probably survive that of the vain and speculative, though enlightened and splendid, author of the *Histoire Naturelle, General et Particuliere*.

sessed by the inferior animals, has long been to me a subject of much amusement and instruction; and, that some results of importance have been obtained, I hope will be made to appear in the "*Memoirs and Illustrations of British Zoology*," now preparing for publication. It is necessary, however, to say something in opposition to the doctrine of BUFFON, alluded to, on this occasion, as the subject is not only inseparably connected with the study of Natural History, of which, indeed, it forms an essential part; but, because my own opinions are in a great measure different from any that have hitherto been promulgated; or, at least, that have come to my knowledge—on this subject.

Although I dissent from the main doctrines attempted to be proved by the charming and popular writer to whom I have alluded, and which, I believe, are pretty generally held in this country, I must again observe, that it is by no means my desire to depreciate the intellectual character of man, or to exalt that of the brute, beyond the

limits of truth: my aim is merely to inculcate a nicer appreciation of the nature of the animals amongst which the lot of man is cast; and to point out to the young *Naturalist*, that he has something of more consequence to learn respecting them, than their mere external characters, and their appropriate names.

To follow the *Count* through all his curious, and ingenious, reasoning upon this subject, attacking the numerous absurdities as they occur, would be tedious, and uninteresting, upon an occasion like the present. I shall therefore confine myself to a few of what appear the principal objections to his doctrine. He attempts to prove, that a much greater difference exists between the mental faculties of man and those of other animals, than is really the truth. According to him, this difference is so great, as to admit of *no comparison*; that it is even *infinite*. He wishes to shew that these faculties differ in nature, or quality; rather than in measure, or degree. He, indeed, attempts to prove*,

* Page 229, &c. vol. iii. Smellie's Edition.

that brutes are merely endowed with *sensation*, and that they are wholly without *any* mental faculties bearing analogy to those of man.

This speculative and eloquent writer considers the brain as a general *internal* sense; the grand receptacle for all impressions received by means of the *external* senses; which, being continued along the spinal marrow, and the nerves, is expanded over the whole body; forming an *organic machine* of which the senses are the parts to which the action of external objects is applied. He allows that other animals have this *internal sense* in common with man: and his view of this part of his subject appears sufficiently clear; since it is demonstrable, by anatomy, that the external senses,—the brain, the spinal marrow, and what are considered the nerves,—are all really parts and continuations of the same sensitive mass. But he goes further, and asserts, that “in brutes, the *internal sense* differs only from the *external senses*, by the faculty it possesses of retaining received impressions.

This faculty is alone sufficient to explain all the actions of animals, and to give us some idea of what passes within them:”—and again, “In man, the brain is proportionally larger than in any other animal, which is an evident proof of his being endowed with this internal material sense. What I mean to inculcate is, that this sense is infinitely superior to the other (in animals). It is subject to the commands of the spiritual substance, which, at pleasure, suppresses, or gives rise to all its operations. In the animal, this sense is the principle which determines all its movements; but, in man, it is only an intermediate and secondary cause of action.”

After shewing, therefore, that the brain is merely an *internal sense*, capable of receiving and retaining impressions, and that it is possessed in common with man and inferior animals; this author attempts to prove, that it is the *sole principle of action* in the one, whilst in the other it is obedient to a higher, more mysterious, powerful, and less definable, principle. In fine, that all

animals, except man, are the mere creatures of sensation.

Now, after no slight consideration of this very interesting subject, facts compel me to be of opinion that inferior animals *have the same mental faculties that are possessed by man*, or the greater part of them, *only in a much less, and more limited, degree*. I believe that *mind*, in whatever animal it may be found, will admit of the same definitions; and it is by the criterion of those definitions that its possession, either by man or inferior animals, must be tried and proved. It is a quality, or principle, so subtle, refined, mysterious, and various, as to quantity and capacity, that no two animals, even amongst the human race, have exactly the same proportions.

Amongst men, it must be allowed that all have the same component parts, both of body and mind, however those parts may vary as to power and capacity. Two vessels may be presented to our notice made of the same materials, having the same use, and the same name: they may both be goblets,

for instance, but, whilst one is capable only of containing the quantity of a pint, the other shall be found sufficiently large to contain a quart, and yet both vessels are goblets. The inhabitants of the least civilized countries of the world have the same general information; the same senses, external and internal, and the same faculties of *perception, memory, association, imagination, judgement, and reason*, in common with the most enlightened Europeans; though, for want of education and exercise, they have not been equally manifested amongst the former, as amongst the latter. This assertion cannot be disproved:—yet; how vast, how immeasurable, is the distance between the intellectual range of an *Esquimaux*, or a *New Zealander*, and such a mind as that of NEWTON!—Yet are they all of the same *species*, they are all *men*. Surely there is less difference, as to mental capacity, between the most degraded of men, and the most intelligent of brutes, than is to be found between the highest and the lowest intellectual powers amongst men.

Perhaps it would neither be an unjust, nor a libellous, arrangement, to divide mankind, *as they at present exist*, into three classes;—those which must be considered *below*, those that are upon a *level with*, and those that rise *above*, the condition of brutes. Those who are best acquainted with the present state of millions of the human race in the remote, and uncultivated, parts of the earth, will be the least inclined to consider such a judgement as unwarrantable or harsh.

Whoever has reflected upon the condition of the inhabitants of *Van Diemen's Land**, or the still more wretched natives of the Islands of *Andaman* in the East†, whose disgusting forms exhibit the most frightful images of animal degradation, of want, and misery, hitherto discovered within the limits of this globe; who have not sagacity to provide either clothing, or a place of ha-

* See the account in Vancouver's Voyages.

† Asiatic Researches, vol. iv. p. 401, and Syme's Embassy to Ava, ch. i. p. 129.

bitation; whose whole time is occupied in dragging along their diseased and shrivelled limbs, covered with filth and vermin, in search of the most precarious, as well as the meanest, food; which chiefly consists of dead and putrid fish cast up by the billows of the ocean. Nothing can resemble, much less exceed, the horrid mixture of deformity, disease, famine, ferocity, and irremediable wretchedness, exhibited by these miserable beings, who have been found on their shores expiring under the agonies of hunger in all its most horrid forms. Whoever, I say, has reflected on the condition of these people, and of many others that could be pointed out, cannot, for a moment, allow them to hold comparison with the sagacious *Beaver*, or with the astonishing powers even of some species of *Ants**, much less will they be able to compete with the still more extensive

* Especially the *Termites Bellicosus*, or Great White Ant of Africa.

mental powers of the *Dog*, the *Horse*, the *Elephant*, and the *Parrot* *.

Allowances should be made for peculiarity of situation, and the power of circumstances, whose influence, indeed, is very great; but not so great as to cause the utter degradation and death of any intellectual principle. Education and the force of example may have very powerful effects on a sensitive being, whether human or brute; but they can never give natural capacity, however they may improve that which is already possessed. It seems to me that circumstances have a greater effect on the senses, and upon those appetites necessary for the support of the corporeal powers, than upon the higher intellectual faculties.

* Of the sagacity of the *Elephant* every one must have heard much; and, whoever wishes to form a notion of what the *Parrot* is capable, would do well to read SIR WM. TEMPLE'S account of the famous bird with which *Prince Maurice* had so remarkable an interview. This relation, which almost exceeds belief, is given by Dr. SHAW in his *General Zoology*, vol. viii. part 2d. p. 504.

Thus, the *Calmuck Tartar* might, perhaps, by a change of circumstances, be brought to forsake his raw horse-flesh, for food of a different description; and, even such horrid wretches as those described by VOLNEY*, whom he saw sitting upon the carcass of a dead camel under the walls of *Alexandria*, disputing with the dogs its putrid flesh; even such degraded beings as those might be taught to relish better fare, and to acquire certain comforts; but, is it possible, according to the present nature of things, for the *New Hollander*, the native of *Andaman*, or the wretches just alluded to, ever to acquire an *intellectual character* equal to the most enlightened amongst civilized men? or, on the other hand, could any circumstances have sufficient power to reduce the most intelligent amongst men, to their state of darkness, and worse than brutal ignorance? Surely not!

Though the procuration of wherewithal to satisfy the wants of natural appetites,

* In his *Travels through Egypt*.

constitutes the first and principal occupation of man, both in savage life, and in a state of civilization; yet it is not in the quality of the food, nor in the modes of procuring it, nor in the manner in which any of the passions are generally gratified, that we are to look for the greatest and most strongly marked distinctions between savages and men of enlarged and superior understandings: no; it is when all the animal wants are supplied, when the mind is no longer obliged to be solicitous for the welfare of the body, but has leisure to try its higher powers; that we must look for the most incontestable proofs of difference; and behold them in the works of art and science, which are the best demonstrations of intellectual superiority. Amongst savages, even the most happily situated, we find no improvements occurring in the lapse of a great number of years, and after the experience of many successive generations, indicative of any strong gleams of intellectual power breaking forth, to dispel the darkness of a long night of savage ignorance, as may be

forcibly illustrated by the natives of some of the loveliest and most happily situated countries in the world;—the Friendly and Society Islands of the great Pacific Ocean. To what extent the mind of a savage, taken at any age, may be cultivated, is very uncertain, and has little to do with the present general view of the subject.

Amongst brutes, superiority is generally determined by physical power; and so it is with the human savage, as we find painfully illustrated by the treatment of females amongst barbarians of every description. Hence the beauty of ROBERTSON'S fine remark:—"Whether man has been improved by the progress of arts and civilization, is a question which, in the wantonness of disputation, has been agitated amongst philosophers. That *women* are indebted to the refinement of polished manners for a happy change in their state, is a point which can admit of no doubt."—The same general indolence, except when roused by hunger; the same thirst for blood; and the same ferocity of character; which distinguish

beasts and birds of prey, also attach to man, in his barbarous and uncultivated state; and the intellectual differences are so faintly marked, that it is sometimes very difficult to assign the superiority.

BURTON endeavours to make it appear, that what has the resemblance of mind in all inferior animals, such as the powers of *memory* and *invention*, for instance, are not really such, but are merely the semblance or reflexion of our own faculties; and that they appear what we suppose them to be from the transference of *our* motives to the animal under observation, when placed in those particular circumstances that would require and elicit the exertion of such faculties; which are really in ourselves, though we are so ready to attribute them to the object of our attention. This, however, is no new doctrine, as it has often been urged by certain metaphysicians; and, though specious when ably advocated, it is certainly fallacious. But, to be clearly understood, it is necessary to give some definition of the principal faculties of the human mind; and

then see whether any powers can be discovered in, what we term, inferior animals, that bear such close analogy with them, as to allow of no other marks of distinction than limitation:—and I shall now make such an attempt, not only that the reader may no longer be detained with what he, perhaps, may deem a digressive preamble; but, that the question may at once be brought to a final issue.

A late extraordinary and original writer on metaphysics, DRUMMOND*, contrary to the most generally received opinions on this curious and interesting subject, opposes the doctrine of separate powers and faculties in the mind, with considerable force, regarding the supposition of distinct faculties as inconsistent with the *unity* of mind. But this view of the subject appears to me likely to occasion very useless squabbling. It is the curse of metaphysical disputation to be continually quarrelling about the

* Academical Questions, 4to. London, 1805.

meaning of words, and the introduction of useless distinctions. It is quite certain, that we may as well say the admission of separate and distinct *external* senses is incompatible with the *unity* of the brain, or the general *internal* sense, of which they are parts; or, as they might be aptly termed, of which they are the *corps des observations*; as to say, that separating and distinguishing the different qualities, or faculties, of the mind, can in anywise be destructive of its *unity*. As a whole is made up of parts, we are more likely to arrive at the knowledge of its true nature, whatever it may be, by attempting, first, to discriminate those parts; and, that the mind has qualities distinct from each other there cannot be the smallest doubt, founded in fact; since the power of *imagination* is one thing, and the faculty of *reason* another: at least, the man must be deemed a fool, who could assert them to be the same. Such being the truth, and especially in reference to the cause of introducing the subject at all in

this dissertation, I shall prefer the method of considering the nature and power of mind, by defining its separate qualities.

The great, leading, faculties of the human mind may be thus simply portrayed:—*Perception*, by which ideas, and the knowledge of things, or separate existences, are received through the medium of the senses;—*Memory*, by which the impressions already received are retained upon the mind;—*Association*, or the faculty by which impressions and images retained, are either called up, or connected together;—*Judgment*, or the power of comparing, weighing, and determining between contrarieties;—*Reason*, the faculty of distinguishing between good and evil, of calculating future consequences, and discerning the fitness of things;—*Imagination*, the last and noblest quality of the mind, is that which more than all the rest stamps divinity on the character of man, and that which more peculiarly distinguishes him from inferiors, even amongst his own species, who are not all alike gifted;—It is creative, and unlimit-

ed; it comprehends the past, the present, and that which is to come;—it extends the power of vision beyond the narrow limits of this globe, even to the confines of the visible universe;—and not only dares to look into the profundity of immeasurable space, but will oftentimes glance with ardent eye into the regions of eternal light and immortal glory. It is the only faculty which can never be fully satisfied or employed in this state of existence, because it is not only able to comprehend all the existences that can be rendered apparent to the external senses, but it can even conceive, and give birth to, new combinations of images; such, even, as have no real existence: it may, therefore, alone be considered as a presumptive evidence of a future life, in which its powers may have greater scope, and be more fully expanded; because, perfect wisdom is an attribute of God; and it would be incompatible with wisdom to give or create any thing in vain.

The *will*, or the power of *volition*, can scarcely be deemed a distinct faculty; if its

existence, which is denied by the *Necessarians*, is to be allowed at all; since it cannot act independently of some other quality of the mind. Though *volition*, under different limitations, seems to be possessed by all animals; yet, perhaps, in none, not even in man, does it amount to *absolute free-will*: nor has it ever been clearly defined. It is quite plain, that an impression must already be received on the mind, or an idea presented to it, before any thing can be willed concerning it. This truth is sufficient to convince us, that the faculty of *volition*, if it be one, is extremely limited. I should rather define it as the presiding, directing, regulating power of the mind, which, though not able to prevent the admission of impressions, or ideas, could determine and regulate the attention towards them when received, suppressing it towards those that were painful, and continuing it towards those that were agreeable. I should prefer such a definition to one that could rank the power of *volition* equal with what we ima-

gine to constitute *free-will* in its fullest extent.

If there were no presiding, or regulating, power over the mind; to what a state of confusion and chaos would it be reduced! being able neither to resist the admission of ideas, nor to arrange and govern them when received, it would be in a state of natural and terrible insanity; myriads of ideal forms would incessantly rise before the troubled soul, and whirl in maddening groups, in ten thousand strange and frightful combinations, till all was dark, and horrible, and the sleep of death fell upon the benighted sufferer! Why should we refuse to believe that God hath given a preventive check for such enormous evils? or why should we object to allow that that check is the power of *volition*?

Consciousness is of two kinds: with that resulting from DIVINE REVELATION we can have nothing to do in this discussion; and the other, which is the mere *internal sensation*, connected with the nature of the

brain, and common to all animals, has already been sufficiently noticed.

Now, we have no other means of judging to what extent, all, or any, of these superior faculties are possessed, either by man or other animals, than by actions. It is idle to talk of things, or principles, *appearing* what they are not; or of one animal *transferring* its motives to another; because, actions are the consequences, or the actual operation, of motives; and the motive, being itself the spring, must reside in the animal which performs the action; whether it is the result of necessity, or of free-will. Let us, therefore, seek for a few plain illustrations in the memoirs of some of the inferior animals, with a view of coming at the truth; whether or not they have mental capacity analogous to that of man, and even superior to what is displayed by some of the most degraded of the human species.

CHAP. IV.

Illustrations to prove the Truth of what has been advanced in the preceding Chapter, in respect to the Mental Capacities of what are termed the Inferior Animals.

IN presenting the reader with a few anecdotes of the nature alluded to in the preceding chapter, I wish to avoid giving such as are, probably, already familiar to him. I shall not, therefore, select my instances from works that are, or at least which should be, well known to every one; and which have been compiled principally with the view of shewing the wisdom of GOD in the *works of creation*. Amongst these, the writings of RAY*, DERHAM†; PALEY‡; and, lately, the *Animal Biography* of BING-

* Wisdom of God, in the *Works of the Creation*.

† Physico Theology.

‡ Natural Theology; or, *Evidences of the Existence and Attributes of the Deity*.

LEY; abound with facts directly tending to prove the truth of the remarks I have made, in support of animals having certain powers of intelligence superior to mere *sensation*. In the "*Memoirs and Illustrations of British Zoology*," now in the press, I have detailed some very remarkable proofs of this kind, which have occurred under my own immediate notice. But, as two or three well-authenticated facts are sufficient to elucidate the truth of any position, or principle, as well as a greater number; I shall restrict myself, on the present occasion, to the mention of a few that may answer my purpose, which, though already published, are contained in works that are not in the hands of every one.

I have always considered the following curious fact as a striking instance of the reasoning faculty, though in no very extensive degree, in a beautiful little bird with which every one must be acquainted. It was noticed by BOLTON, the very ingenious, but very unfortunate, author of the "*Harmonia Ruralis*."

“ On the 10th of May, 1762, I observed a pair of *goldfinches* beginning to make their nest in my garden: they had formed the ground-work with moss, grass, &c. as usual; but, on my scattering small parcels of wool in different parts of the garden, they in a great measure left off the use of their own stuff, and employed the wool; afterwards, I gave them cotton, on which they rejected the wool, and proceeded with the cotton; the third day I supplied them with fine down, on which they forsook both the other, and finished their work with this last article.”

In this instance we can scarcely admit the law of necessity, which is said to be the very principle of what is termed *instinct*. These beautiful little architects appear before us in the light of *free-agents*, exercising the prerogative of choice; to determine in which implies a reasoning faculty; since a calculation of the different qualities of the materials to be used, and their effects, must necessarily be made, before those which are best fitted for the work could be selected.

There is a very interesting anecdote, written by a Mr. Simpson, of New York, which is inserted in the *Medical Repository*, an American work that displays considerable ability. It has since been republished in the *Philosophical Magazine* of this country*. It is as follows:—

“ During my residence at *Wilton*, early one morning I heard a noise from a couple of *martins*, who were jumping from tree to tree adjoining my dwelling. They made several attempts to get into a box, or cage, fixed against the house, which they had before occupied; but they always appeared to fly from it with the greatest dread, repeating those loud cries which first drew my attention. Curiosity led me to watch their motions. After some time a small *wren* came from the box, and perched on a tree near it, when her shrill notes seemed to amaze her antagonists. After a short time, the *wren* flew away. The *martins* took this opportunity of returning to their

* Vol. v. p. 101.

cage: but their stay was short. Their diminutive adversary returned, and made them fly with the utmost precipitation. They continued manœuvring in this way the whole day, and I believe the *wren* kept possession during the night. The following morning, on the *wren's* quitting the cage, the *martins* immediately returned, took possession of their mansion, broke up their own nest, which consisted of twigs of different sizes; and, setting to work with more ingenuity and industry than I supposed they possessed, they soon barricaded their doors. The *wren* returned again, but could not re-enter. She made attempts to storm the works, but did not succeed. I will not presume to say that the *martins* followed our modern maxim, and carried with them a sufficiency of food to maintain a siege, or that they made use of the abstinence which necessity sometimes, during a long and bad storm, might probably occasion; but they persevered, for near two days, to defend the entrance within the barricado: and the *wren*, finding she could not

force an entry, raised the siege, quitted her intentions, and left the *martins* in quiet possession, without further molestation."

In this instance both invention and foresight are eminently conspicuous, and the faculties of *judgement* and *reason*, so clearly manifested by the birds themselves, and not reflected from the mind of the observer; that no doubts can be entertained on the subject. There is no *transference of motives* here, for we behold an act that could never have been taught by any education, but which arose out of the peculiarity of the circumstances, under which the little sagacious pair were placed for the first time in their lives; and, having never been under the control of man, they could not profit by any of his lessons. This was clearly a voluntary act dictated by a principle of uncommon intelligence.

The charming Naturalist of *Selborne*, whose elegant writings are now well known and justly appreciated, has related a very pleasing anecdote of a certain *willow-wren*, which is also beautifully illustrative of fore-

sight, and a reasoning faculty, in one of the most diminutive of British birds*. "A farther instance I once saw of notable sagacity in a *willow-wren*, which had built in a bank in my fields. This bird a friend and myself had observed as she sat in her nest; but were particularly careful not to disturb her, though we saw she eyed us with some degree of jealousy. Some days after, as we passed that way, we were desirous of remarking how this brood went on; but no nest could be found, till I happened to take up a large bundle of long green moss, as it were, carelessly thrown over the nest, in order to dodge the eye of any impertinent intruder†."

I should have hesitated to mention the following remarkable proofs of more than instinctive sagacity in the common *fox*, from the worthy and eccentric PONTOPPIDAN, had I not known several instances of

* In the 14th Letter to the Hon. Daines Barrington.

† In the same letter in which this little anecdote is introduced, are several other instances of remarkable sagacity in inferior animals.

a similar kind, and even more extraordinary, that have occurred in this country; and which are detailed in another place. In Norway it appears that, amongst other purposes, the *fox* uses his long, bushy, tail to catch *crabs*: those shell-fish, being fond of any thing covered with long hair, will generally lay hold of it the moment it comes within their reach; and the cunning angler no sooner feels the crabs taking fast hold of this very singular bait, than he runs off, with a sudden jerk, and draws his prey triumphantly to the shore.

The *Norwegian fox* is also indebted to his ingenuity for another mode of obtaining food, when his strength and speed has been unsuccessful in the chase. Having watched for an *otter*, engaged in the act of fishing for himself near the shore; when he has crept to a suitable position, the *fox* hides himself behind a large stone; and, when the *otter* comes to devour the prey, he pounces upon him with such a sudden and high leap, that the *otter*, though at other times by no means afraid of the *fox*, but

even more than a match for him, being terribly alarmed, instantly flies off with the utmost precipitation, and leaves the booty behind.

One day a certain person was surprised, on observing a *fox* employed near a fisherman's hut in laying a considerable number of eods' heads all in a row; and was at a loss to conceive what could be the object of the animal, until he saw, that having secreted himself behind them, the *fox* made a booty of the first *crow* that came to devour them.

But the most extraordinary of these relations, is that which describes his mode of getting rid of the fleas which pester him at certain times of the year. In order to accomplish so desirable a purpose, this crafty animal collects a bunch of moss, or straw; and, taking it in his mouth, he gradually backs himself into the water, slowly wading step by step, deeper and deeper still, in order to allow time for the fleas to retire from the coldness and unpleasant sensation of the water, on to the warm and dry parts

of the body; till, at length, having passed the neck, and being assembled all together upon his head, which is then alone above the surface of the water, he gradually sinks that part also, leaving his nose only, and the bunch in his mouth, dry; as soon as he has discovered that his numerous little enemies have retreated into the trap placed for them, he suddenly drops the bunch of moss, or straw, into the water, and immediately runs off, well washed, and exulting in the success of his stratagem.

In these relations we assuredly behold the display of reasoning powers very superior to what can be found in the lowest of human savages; some of whom have not even sagacity to enable them either to acquire food, under circumstances of any difficulty, or to rid themselves of the vermin which destroys them, as I have already hinted in respect to the natives of the *Islands of Andaman*, which are but a few amongst innumerable instances that might be adduced, if it were necessary. I do not wish, unnecessarily, to multiply the relations of si-

milar facts, nor to try the patience of the reader, by inserting too many instances that may be deemed of the same nature; but, the following account is so very curious and interesting, as well in respect to the circumstances detailed, as to the period in which it was written, and the parties who were concerned, that I hope it will neither be considered tedious nor inapplicable on the present occasion. It is an authentic and original letter addressed by the celebrated Sir John Harrington * to the accomplished *Prince Henry*, son of JAMES I. King of England; which was inserted in the *Gentleman's Magazine* for February, 1774 †.

* Whose elegant little fugitive pieces were published in a volume entitled *Nugæ Antiquæ*, at London, in the year 1669. But this letter was not discovered at that time, nor, indeed, till long afterwards.

† This letter having been inserted amongst the *Selections of Curious Articles* from the *Gentleman's Magazine*, which have been lately published in 4 vols. 8vo., it will now be more generally known.

*Copy of a Letter from Sir John Harrington
to Prince Henry, Son of King James I.
concerning his Dogge.*

" Kelstone, June 14th, 1608. .

" May it please your Highnesse to accept in as goode sorte what I now offer as it hath done aforetyme; and I may saie *I pede fausto*; but having good reason to thinke your highnesse had goode will and likinge to reade what others have tolde of my rare dogge, I will even give a brief historie of his goode deedes and straunge feats; and herein will I not plaie the curr myselfe, but in goode soothe relate what is no more nor less than bare verity. Although I mean not to disparage the deedes of Alexander's horse, I will match my dogge against him for good carriage; for if he did not bear a great prince on his back, I am bold to saie he did often bear the sweet wordes of a greater princesse on his necke.

" I did once relate to your Highnesse after what sorte his tacklinge was wherewithe he

did sojourn from my house at the bathe to Greenwich Palace, and deliver up to the courte there such matters as were entrusted to his care. This he hathe often done, and came safe to the bathe, or my howse here at Kelstone; with goodlie returnes from such nobilitie as were pleasede to emploie him; nor was it ever tolde our ladie queene that this messenger did ever blab ought concerninge his high truste, as others have done in more special matters. Neither must it be forgotten as how he once was sente withe two charges of sacke wine from the bathe to my howse, by my man *Combe*; and on his way the cordage did slackene, but my trusty bearer did now bear himselfe so wisely as to covertly hide one flasket in the rushes, and take the other in his teethe to the howse, after whiche he wente forthe and returnede withe the other parte of his burden to dinner; hereat your highnesse may perchance marvele and doubte, but we have livinge testimonie of those who wroughte in the fieldes and espiede his worke, and now live to tell they did muche

longe to plaie the dogge, and give stowage to the wine themselves; but they did re-fraine, and watched the passage of this whole businesse.

“ I need not saie how muche I did once grieve at missinge this dogge, for on my journie towards Londone, some idle pastimers did divert themselves with the huntinge mallardes in a ponde, and conveyed him to the Spanish ambassador's, where in a happye hour after six weekes, I did heare of him; but such was the cowrte he did pay to the Don, that he was no lesse in good likinge there than at home. Nor did the household listen to my claim, or challenge, 'till I rested my suite on the dogges own propps, and made him perform such feates before the nobles assembled, as put it past doubt that I was his master. I did send him to the hall at the time of dinner, and made him bringe thence a pheasante out of the dish, which created much mirthe, but much more when he returnede at my commandement to the table again, and put it again in the same cover. Herewith the

companie was well content to allow me claim, and we bothe were well content to accept it, and came homewardes. I could dwell more on this matter, but *jubes renovare dolorem*.

“ I will now saie in what manner he died. As we traveled towardes the bathe, he leapede on my horses necke, and was more earneste in fawninge and courtinge my notice than what I had observed for time backe, and after my chidinge his disturbing my passinge forwards, he gave me some glances of such affection as movede me to cajole him; but, alas, he crept suddenly into a thorny brake, and died in a short time.

“ Thus I have strove to rehearse such of his deedes as maie suggest much more to your highnesses thought of this dogge. But havinge saide so muche of him in prose, I will say somewhat too in verse, as you may find hereafter at the close of this historie. Now let Ulysses praise his dogge *Argus*, or Tobite be led by that dogge whose name doth not appeare, yet could I

say such things of my *Bungey*, for so was he styled, as might shame them both, either for good faith, clear wit, or wonderful deeds; to saie no more than I have said of his bearing letters to London and Greenwiche, more than an hundred miles. As I doubte not but your highnesse would love my dogge if not myself, I have been thus tedious in his storie, and againe saie, that, of all the dogges near your father's cowrte, not one hath more love, more diligence to please, or less pay for pleasinge, than him I write of; for verily, a bone would contente my servante; when some expecte greater matters, or will knavishly find out a bone of contention.

"I now reste your highnesses friend in all service that maye suite him.

"JOHN HARRINGTON."

"P. S. *The verses above spoken of are in my book of epigrams in praise of my dogge Bungey to Momus.—(Book 3. Epig. 21.) And I have an excellent picture curiously limned to remain in my posterity.*"

One can scarcely help regretting that the entertaining writer of this account did not specify the kind, or species, of this celebrated *dog*. The incidents which appear to have struck the owner of this sagacious animal with the greatest force, as implying more than ordinary intelligence, are the instances of his travelling between *London* or *Greenwich*, and *Bath*, as the bearer of letters and important despatches: which, indeed, are very surprising proofs of what a dog may be taught. But such instances are precisely of the nature of those quoted by BUFFON* to prove that inferior animals are the mere creatures of *sensation*, and have no intellectual faculties, according to what has before been hinted. He observes: "Let us examine the conduct of an animal that has been instructed by man. A dog, for example, though excited by the most violent appetite, will not venture to wrest, from

* Page 235 of his *Dissertation on the Nature of Animals*, vol. iii. of his *Natural History*.

the hand of his master, the object that would gratify him; but he, at the same time, makes a number of movements in order to obtain it. Does not the dog, in this case, seem to combine ideas? Does he not appear to desire, and to fear? in a word, to reason nearly in the same manner as a man, when violently tempted to take what belongs to another, but is restrained by the fear of punishment? This is the vulgar mode of accounting for the conduct of animals. We naturally transfer our own motives to animals, when placed in similar circumstances; and the analogy is said to be well founded, because in man, and in the animal, the conformation of both the *internal* and *external* senses is similar." Now, the truth of these remarks is sufficiently clear, and must be assented to: but we must extend our view a little further; and, though ready to admit that most of the actions of inferior animals, even all of them upon ordinary occasions, are attributable to the power of *sensation* acted upon by necessity; yet we must yield to facts, and grant

that superior faculties may be discovered, and their energy called into play, in such a manner as to demonstrate that the animal is not merely *imitative* or *sensitive*. Had Sir John Harrington's *dog* performed no other feats than carrying letters or parcels between one town and another, there would have been nothing in this relation more surprising, or more illustrative of the doctrine I have been endeavouring to establish, than the imagined example just quoted from BUFFON; because, such performances, together with the removal of the pheasant from table, at the command of his master, might easily have been taught.

But, there is another fact mentioned in the relation that is very striking, and it is one which absolutely implies the possession of a reasoning faculty. I mean that circumstance where the dog, on his journey between *Bath* and *Kelstone*, with two bottles of *sack*, finds, from the derangement of his tackling, that he can no longer carry both the bottles; he pauses a while to consider the few alternatives to which he can

resort; and, at length, determines upon that which is the very best, and safest, in his situation; and one, that not only implies a calculation of future consequences, but which actually proves the animal to be acquainted with the nature of crimes; because, foreseeing that the wine might be stolen if left in an exposed situation, he takes care to hide this part of his charge, which he cannot possibly take with him, with the utmost care, in a place, under such circumstances, where it was the least likely to be discovered.

Here is an evident act of one of the highest powers of mind wholly uninfluenced by the lessons or signs of any one, for no one was present. It is an action proceeding from a plainly apparent motive; and quite distinct from any operation, or exertion, of mere corporeal sense, at least from what we understand as such. Perhaps no servant of *Sir John's* family could have acted more judiciously in a similar predicament.

In the short, but affecting, account of the death of this interesting dog, we perceive

something like a presentiment or conviction; of its approaching fate—a feeling which has been frequently noticed in the same intelligent animals, but which has seldom been so beautifully arrayed in language as by the pen of the immortal HOMER:—

“ He knew his lord; he knew, and strove to meet;
In vain he strove to crawl and kiss his feet;
Yet (all he could) his tail, his ears, his eyes
Salute his master, and confess his joys *,” &c.

Never does the doctrine of the transmigration of the soul appear so reasonable, or so affecting, as when we meet the glance of intelligence beaming from the eyes of an expiring animal not quite devoid of reason. I have occasionally had spaniels, with so much acuteness of perception, that they have literally understood my smiles, and my frowns, almost as well as my voice and my gestures. It is a very ancient opinion, that *dogs* are in possession of prophetic feelings; and have the power of beholding departed spirits, as they glide through the

* The *Odyssey*, book 17th.

air: but this is surely to be classed with the multitude of vulgar errors; and we must not suffer ourselves to be led away from our argument by such phantoms.

As it is plain, that an animal possessing *judgement*, or *reason*, must also have had *perception*, *memory*, and *association*, before any impression could have been given, and called up, on which to judge, or reason; the same facts which prove the possession of those higher powers necessarily infer the existence of the others. I might, probably, have selected many instances of greater consequence in establishing the truth of my position; but those I have adduced may be sufficient to shew what are my opinions on the subject. In an argument of this kind it is always unnecessary to multiply proofs, when a few well-established facts can illustrate all that is required. On the present occasion, I have merely wished to awaken the reader's attention to a very curious and interesting subject, and to enable him to apply other and more important facts to a further illustration of the same truth; for,

I am well convinced, if, according to BUFFON, "*to doubt, to deliberate, and compare, are the essential characters of reason* ; it will certainly be found, that many other animals, besides mankind, are in the possession of a reasoning faculty. I am quite satisfied that all animals, of whatever class or genera they may be, have the degrees of mind that are necessary for the attainment of the particular ends of their existence, to which they have been adapted by the FIRST, GREAT, ALMIGHTY, CAUSE ; and, that those mental faculties are not always *passive*. Man, as having a higher destiny, a superior career to run, is necessarily gifted with larger faculties, powers commensurate to the sublime objects of his creation ; but he is still an animal ; and, in a discussion of this nature, must be considered as such. It is not to insult or sully his dignity, that he is thus connected with the creation of which he was designed by nature to be the lord : it is to shew him that he can obtain rank only as he refines the feelings of his heart ; cultivates his understanding ; fulfils his

higher duties; and endeavours so far to comprehend the vast system of the universe, and of the laws which govern it, as to become more clearly acquainted with the proper objects of pursuit, whilst upon earth; a knowledge which can never be fully acquired till he has ascertained the true nature of the objects by which he is surrounded, and which are, in so great a degree, submitted to his management and control.

To enter more fully into the objections which might be urged against the theories of BUFFON, in respect to the nature of animals, might be deemed improper in a work of this limited and general nature. But I cannot take my leave of the *Dissertation*, which I have thus briefly noticed, without observing, that, notwithstanding its numerous errors, it contains so many brilliant passages, so many just remarks, and so many beauties, that it ought to be read by all who take delight in studies of this kind.

After what has been remarked; and if such views, and such acquirements, on the

part of man, are allowed to be something like a criterion of superiority ; it must be confessed, that full two-thirds of the human race, in their present state, are little above the level of, if they are not inferior to, those animals they are at all times so ready to despise, and too often to ill-treat, as below them ; but which are, at the same time, quietly and regularly fulfilling the duties allotted to them, and daily exemplifying faculties for which we may in vain look to the human savage : and is it not true that the greater part of men think the business of life fully performed when they are able to eat, drink, sleep, and exist ?—nay, further, that most of their days are employed in acquiring the power of being able to do so, with something like comfort to themselves.—Most other animals eat, drink, sleep, and exist with less trouble, and more pleasure. In the important business of supporting life, therefore, men are equalled, if not excelled, by their despised associates of the animal world.

Other men, placed above the reach of

want, and the necessity of labour, by a variety of fortuitous circumstances, present a more distressing spectacle of human degradation, even than those whom adverse fortune has compelled to work with unremitted toil for a precarious subsistence; since their pleasures are derived from vice and folly of every kind; gratifications which soon corrode, and finally consume, that period of existence which was granted for the noblest purposes, even to prepare the soul for the fulness of knowledge, and the maturity of bliss. If the human mind is capable of the very highest, of god-like, attainments, we should, at the same time, reflect, that the societies of no other animal present scenes which bear any resemblance to the profligacy and wickedness that fill the streets and avenues of large cities. These are degrading to a point far lower than the brute can possibly fall: because, it is an attribute of what is termed instinct, or a limited mental capacity, constantly to uphold the possessor to its duty;—and,

surely, it would be better to have inferior duties to perform, and never, for a moment, to neglect them; than have the highest employments allotted to us, and prove ourselves utterly unworthy, and incapable of fulfilling, them: and, when disease comes upon him, those maladies from which most other animals are exempted, what weakness is greater than the weakness of man? If he is degraded by ignorance, vice, or folly, the spectacle is still more painful, still more humiliating. Let the proud mortal who exults in all the pride of his superior condition, behold the ravings of a maniac in his agonies of distraction; or contemplate the wretched miseries of one affected with canine madness, writhing upon the ground, foaming at the mouth, and barking and howling like the unhappy brute from which the fatal infection has been caught. Let him meditate on these sad proofs of his animal imperfections, and then examine the tenure by which he holds his much boasted superiority. He

will then see how frail, how insecure it is,
and how certainly it can rest alone on
mental attainments!

“ How poor, how rich, how abject, how august,
How complicate, how wonderful, is man !
How passing wonder He who made him such !
Who center'd in our make such strange extremes !
From different natures, marvellously mix'd,
Connexion exquisite of distant worlds !
Distinguish'd link in being's endless chain !
Midway from nothing to the Deity !
A beam ethereal, sully'd and absorpt !
Tho' sully'd and dishonour'd, still divine !
Dim miniature of greatness absolute !
An heir of glory ! A frail child of dust !
Helpless immortal ! insect infinite !
A worm ! a god !——”

CHAP. V.

Some important Reflexions, arising from a Consideration of the Nature of Animals. On the State of Man. His Free Agency. Predestination. The Doctrines of Chance. Atheism.

ONE conclusion may be drawn from what has been advanced in the preceding chapter, if the view of the subject be correct, which is of too much importance to be left without notice; and I should consider myself deeply culpable, were I to leave my opinions open to the most dangerous misrepresentation.

If it be true that inferior animals are possessed of the same mental faculties with man, only in a more limited degree, which I believe to be the case; it may be thought to follow, that, being of the same nature, they may have similar claims to a future existence; because, it could not be clearly and satisfactorily shewn, why mind should

become extinct at the death of one animal, and not of another.

On a subject that must ever be a matter of opinion in this world, no one can pretend to speak decidedly. Whatever is limited to conjecture may be fairly deemed of little importance to our present state. No man knows whether the beasts of the field utterly perish in death, or they do not. In the book of inspiration, that volume which assuredly contains a revelation of the word of God, there are no passages that can be allowed conclusive on this point. It is true, indeed, we are there told, that the beasts shall perish, for the mighty son of Jesse, the favoured bard of the MOST HIGH, hath sung, "Man being in honour abideth not : *he is like the beasts that perish.*"—And again, "Man that is in honour, and understandeth not, *is like the beasts that perish* *." But this merely proves that some beasts perish, and that it is possible for *men* to be those beasts. These allusions are of the same nature with

* Psalm xlix. 12, 20.

many others in the sacred volume, which assert that the wicked *shall be as the grass that withereth*; which is, that they shall be utterly consumed.

In another place it is said,—“*that which befalleth the sons of men befalleth beasts; even one thing befalleth, them: as the one dieth, so dieth the other; yea, they have all one breath; so that a man hath no pre-eminence above a beast:—All go unto one place; all are of the dust, and all turn to dust again.—Who knoweth the spirit of man that goeth upward, and the spirit of the beast that goeth downward to the earth*?*” This passage is a very positive confirmation of the only conclusion to which an investigation of the nature of animals, as to their existence, can be brought, which is,—the *materiality of mind*, as well as of body. The term *mind* is merely given to designate certain qualities of the brain; and all animals having brains, of apparently similar consistence and organization, have mind: and it follows, that if the brain

* Ecclesiastes, iii. 19, 20, 21.

perishes, the mind must be destroyed also. But let not this view of the subject alarm us, by bringing with it all the terrors of annihilation ; since we have comfort in the depths of true philosophy, even though we soar not to the blessed heights of a pure religion.

In the physical world we perceive that every stream hath its fountain ; and that light itself, though fluctuating to our vision, proceeds from an orb that burneth and shines with an equal and a perpetual glory, sending forth its beams to the remotest indefinite ramifications. It would be as difficult to say where linger the farthest rays of light, as to point out the atom which is possessed of the least portion of mental intelligence.

There is also an eternal and a never-failing fountain of intelligence ; and that fountain is the DEITY ; from whom the emanations of mind are imparted to the creatures of *His* formation in such proportion as *He* deems fit to carry into effect the various purposes of the creation. Animals are the

agents by which the most important designs are accomplished ; yet they are but temporary vehicles in the hands of OMNIPOTENCE, bearing certain portions of mind for particular objects ; and, when those objects are accomplished, they die. Man, having more to perform, having a higher destiny, than other animals ; being, as YOUNG has beautifully expressed it, the most

“ Distinguish'd link in being's endless chain !
Midway from nothing to the Deity !”

has necessarily larger powers, and a wider range of action* ; and, if he makes good

* It is a striking peculiarity in the character of man, as an animal, in which he differs from all others, that he is rendered capable of dwelling in every part of the globe, with the exception of the poles themselves. This truth, which seems to prove in the strongest manner that man should have universal dominion, did not escape the notice of the splendid historian of Rome, who has remarked, that “ The Romans made war in all climates, and by their excellent discipline were in a great measure preserved in health and vigour. It may be remarked, that man is the only animal which can live and multiply in every country from the equator to the

use of those powers, there can be nothing extraordinary nor unphilosophical in a belief that they shall be continued, and even enlarged, and improved, and exalted to a still nobler field for exertion, after the business of this life is accomplished, and the mortal frame is worn out and decayed. It is, indeed, more difficult to believe the extinction of mind after death, than its eternal continuance; because we cannot regard mental intelligence in any other light than as part of the Divine essence, which must be eternal if God is eternal.

The greatest difficulty is in being able to conceive how a spiritual existence can be engrafted on a material or temporary existence. But there are innumerable phænomena in nature quite as difficult to comprehend and explain. We perceive that even inanimate bodies have the most remarkable qualities inherent in them; such as the

poles. The hog seems to approach the nearest to our species in that privilege."—*Decline and Fall of the Roman Empire*, vol. i. p. 349.

loadstone, for instance, which has the power to move and attract other bodies in a manner, and for purposes, that are not very easily explained. If it were necessary for man to know the most secret mysteries of nature, there can be little doubt that they would have been imparted to him ; but, not being necessary, for any of the purposes of his present existence, they are hid from his view, and he finds the bounds that are set to his knowledge. He may, however, rest assured, that, though matter may continually change its forms, and though it may even dissolve and be separated into the minutest parts, *principles* are eternal, because they uphold the universe, and proceed from an Omnipotent Power that endureth for ever. Hence we may conclude, that, notwithstanding the destruction of all material bodies, the soul, or principle, that animates them, continues to live, and to act, though in another form.

It is far from my desire to introduce any subjects irrelevant to the professed object of this little work ; but, if it is an important

aim of the *Naturalist* to ascertain the true nature of man, it is surely necessary for him, also, to come to some determination as to the probable objects of his creation; seeing that, in his most improved state, he is capable of performing so much.

A cynical philosopher might ask, and some of the wretched infidels of France, calling themselves *philosophers*, with a sufficiency of disgusting and impious assurance, have asked, Why did God create *Man*?—if *He* saw that it was impossible for him to be either happy or perfect in this world;—if *He* saw that his whole life was to be a vascillation between good and evil;—and, that his derelictions from duty and virtue would infallibly be more frequent than his obedience to the dictates of true wisdom;—that he never could arrive at the dignity of a purely intellectual being;—and, that it would be scarcely possible for him to be saved from a condemnation from which other animals were exempted, as from one they never could merit!

It may be answered, that, though the final

punishment for the commission of evil: Had we been mere machines, and not free-agents, we could have done neither good nor evil, and there would have been no occasion for rewards, or punishments: because; good and evil must be active, to be effective; and, no one can be active without the will to act.

I have no desire to enter into any long theological discussions that are foreign to the objects of this work; but the *moral* duties of man are so intimately connected with what may be termed his *physical* duties, that I cannot entirely pass over some popular doctrines which affect his condition and his views. As to *predestination*, which reduces man from a free-agent to an automaton, so far as it concerns the foreknowledge of the SUPREME, a doctrine that is believed by many who nevertheless consider themselves to be *Christians*, it is not easy to see how the liberty of man can be affected by it, so long as he is, himself, without that foreknowledge. Granting, as we must do, that the ALMIGHTY is pre-

viously acquainted with every action of our lives, and that *He* knows what will eventually be our fate; that knowledge is hid from us, and cannot, therefore, in any degree, affect the determination of to-morrow, when a question, involving a good or evil action, shall be set before us for our choice; because, the only guides to which we could apply for counsel to assist in forming a determination, would be our reason and judgement; the excellence of which very much depends upon the nature of our education, upon our sense of right and wrong, and upon our means of calculating the supposed consequences; without, I presume, ever dreaming of what might be the foreknowledge of God upon the subject, or of what might have been *predestined* for us to perform, which it would be impossible for us to know. There are no doctrines so melancholy, so repugnant to our feelings, and, I believe I may add, so contrary to the true nature of man, and the designs of OMNIPOTENCE concerning him, as those of *predestination*. On this subject a fine re-

mark was made by JOHNSON during his tour through the *Hebrides* *. "Moral evil is occasioned by free-will, which implies choice between good and evil. With all the evil that there is, there is no man but would rather be a free-agent, than a mere machine without the evil; and what is best for each individual, must be best for the whole. If a man would rather be the machine, I cannot argue with him. He is a different being from me †."

* Recorded by BOSWELL in his Tour, third edition, p. 104.

† A belief in *predestination* is generally, if not always, coupled with a faith in omens and predictions also; and it is scarcely credible that any "reasonable creature can ever imagine, that the all-wise God should inspire owls and ravens to hoot out the elegies of dying men; that he should have ordained a fatality in number, inflict punishment without an offence; and that being one amongst the fatal number at a table, should be a crime, though contrary to no command, not to be expiated but by death! That even spiders and candles should have a foreknowledge of man's destiny; that certain days are unlucky, as if the good and virtuous were not, at all times, in all places, and in all numbers too, assured of the protection of the infinitely merciful God."—HOWE'S *Meditations*, Med. lxx.

But, above all other arguments, had we been the hapless victims of *predestination*; had we been mere machines, mere automations, obedient to movements played upon by an invisible hand, from which there could be no deviation or escape, where would have been the necessity of the coming of CHRIST JESUS, the only teacher of true wisdom? *His* doctrines, and *His* manner of inculcating and promulgating them, absolutely prove the freedom of man.

There is another character, though I hope it would be difficult to find him in this country, still less capable of taking an enlarged and enlightened view of the creation, and of appreciating the duties of man in it, even than the *predestinarian*. This character is the dark and melancholy *Atheist*. Of all the follies and absurdities of man, those of infidelity and scepticism, as to the existence of a supreme, all-wise, all-powerful, and universally benevolent, Being, are the most remarkable. It is "*kicking against the pricks*" with an obstinacy as ridiculous as it is fatal. A man

may, with as much reason, doubt his own existence as that of the Divinity; because he only knows that he himself exists through the sense of feeling, and internal consciousness; and, the existence of God must be *seen*, in the works of the creation, as plainly as his own can be *felt*; every thing that we know coming through the medium of our senses. What has been remarked on this subject by an able and enlightened critic of our own times and country, is very just. "No thinking man, we conceive, can doubt that there are marks of design in the universe; and any enumeration of the instances in which this design is manifest, appears, at first sight, to be both unnecessary and impossible. A single example seems altogether as conclusive as a thousand: and he that cannot discover any traces of contrivance in the formation of an eye, will probably retain his atheism at the end of a whole system of physiology *."

For a wretched, short-sighted, mortal to

* Edinburgh Review, vol. i. p. 289.

talk about proving the existence of his **MAKER**, by attempting to explain *His* nature and origin, as he would that of a table or chair of his own manufacturing, is ridiculous almost beyond belief. "O man! who art thou that repliest against **GOD**? Shall the thing formed say to him that formed it, why hast thou made me thus*?"

But what right has *impiety* to ask proof of the **DIVINE** Power beyond what is *felt* to exist? which is proclaimed by the stars in their courses; by the lightning in its flash; by the thunder in its roar; and, by one universal shout of Nature. Should not the **Atheist** of inferior mental capacity remember that the immortal and the divine **NEWTON** commenced his sublime career in scepticism, but came to be a firm believer long before his illustrious course upon earth was finished. Should he not rather, since he dares to assert new causes for the origin, and new laws for the government, of this world, attempt to prove the truth of his

* Romans, chap. ix. ver. 20.



own gloomy and vain speculations, and shew us how *something* can be produced from *nothing*; how, what he calls *chance*, or *fortuitous circumstances*, could bring about the wonders of creation; how the operations of design could be put in force without a designer: in fine, how all the various phænomena, which daily recur to our sight, could be produced!

The attentive and enlightened *Naturalist* can never be made to comprehend the doctrines of *chance*, when the functions of every animal he beholds are proofs against them. What would become of the poor snipe, if nothing but grain could be procured for food? or of the sparrow, if only soft slugs and worms, which live under the surface of the lonely quagmire, could be gained? If the peculiar characteristics of animals, especially of their outward forms, are forced upon them, and are even created, by the operation of external accidents and circumstances, how happens it that the bird is expressly formed for certain habits and destinies, before it is protruded from the egg-

shell; and, if it is prevented from entering upon its predestined career, that it dies?—how happens it that the lapse of century after century, and the accidents of a countless number of generations, are unable to produce the slightest change, either in the form, or in the nature of animals?—how happens it that the bird sings the song, builds the nest, and lays the egg, peculiar to the species, without having ever been taught by any other than by that same ALMIGHTY BEING who gave to man the sovereignty of reason; but, with it, the liability to err, and the power of creating absurd theories, and of forming the most extravagant speculations?

“Tho’ night unnumber’d worlds unfolds to view,
Boundless creation! what art thou? A beam,
A mere effluvium of his majesty.
And shall an atom of this atom-world
Mutter, in dust and sin, the theme of heav’n!
Down to the centre should I send my thought,
Thro’ beds of glitt’ring ore and glowing gems,
Their beggar’d blaze wants lustre for my lay:
Goes out in darkness: if, on tow’ring wing,
I send it thro’ the boundless vaults of stars,

(The stars, tho' rich, what dross their gold to Thee,
Great, good, wise, wonderful, eternal King !)
If to those conscious stars thy throne around,
Praise ever-pouring, and imbibing bliss,
And ask their strain; they want it, more they want,
Poor their abundance, humble their sublime,
Languid their energy, their ardour cold;
Indebted still, their highest rapture burns,
Short of its mark, defective, tho' divine."

CHAP. VI.

On the Extent of Man's Dominion over animated Nature, and
the Caution he ought to observe against abusing his Power.
On the Sense of Pain in inferior Animals.

It should be an important object in the pursuits of *Natural History* to ascertain the true relation which one animal bears to another, and their utility in the great scale of creation. A knowledge that can only be obtained by long observation, and unwearied investigations of the nature of animals. Such inquiries will go far to shew the real extent of man's dominion over them, and to convince him that he has no right to injure or wantonly to destroy any animal which has been appointed by the infinite wisdom of God to fill up some useful link in the vast chain of creation: such inquiries will also assuredly bring the conviction, that every animal has, not only its rights and privileges, but, certain duties

to fulfil, the exercise of which is necessary for the good of the whole.

I am neither a disciple of RITSON*, nor an approver of his most absurd doctrines, well knowing, that it is not only impossible to prevent the waste of animal life, on our part, but, that we have a natural right to sacrifice it to a certain extent, to our own support; notwithstanding the opinion of many pious persons, which condemns the use of animal food, because, in the Mosaical account of the primitive times, and the creation of man, fruits and herbs alone are pointed out to him for his food, by the CREATOR *himself*. But the organs, the form, the constitution, and the situation, of man, saying nothing of his propensities, afford certain proofs that he was designed to use animal food as one of the means of supporting his existence; and, it is not against the *use*, but the *abuse*, of his power

* The apparently insane author of a work entitled "*An Essay on Abstinence from Animal Food, a Moral Duty*." 8vo. London, 1802.

ever other animals, that I am about to protest.

If I had not at various times, in the course of my studies this way, deeply felt the truth and importance of the following observations, I should have confined them to the solitude wherein they originated; for, of all the vanities arising from the weakness of man, that of ostentatious feeling is the most ridiculous, and contemptible. But I am not without hope, that an honest declaration of sentiments which at one time have filled my heart with the purest delight, and which, at another, have made it the seat of the most poignant anguish, will have some beneficial effects.

In early life, the ardour of my love for the pursuits of *Natural History* was so great, that I overcame many very serious difficulties, in order to make myself personally acquainted with the lives and manners of various animals in their native haunts; and, with this view, I spent several years in wandering through such parts of Great Britain as were least known. In these

rambles it was my custom, on those occasions when my gun was necessarily laid aside, unless something of unusual importance occurred to prevent me, to spend such days of appointed rest abroad in the fields, or woods, or wildest recesses of nature; as free, and as far, as possible from the intrusion of man: where,—in strolling along the banks of meandering streams, whose sweet murmurs mingled in delightful harmony with the soft music of the wind; or, wandering through verdant fields, bedecked with flowers of every tint; or striding along the summit of some cloud-capt mountain; or, lying on the loftiest pinnacle of some huge o'erhanging rock, in watchful contemplation of the restless billows of the main; or, in penetrating the thickly tangled woods, whose gloom was scarcely pervious to the light of day,—I have endeavoured as much as possible to abstract my mind from all frivolous objects, and, shutting out the corroding cares of life, fix its whole attention on the *being* and *attributes* of that ALMIGHTY, EVERLASTING, ADORABLE, GOD,

who hath created the wonders of this beautiful orb, the earth, and all the vast magnificence of the starry heavens.

On such occasions I seemed as a solitary worshipper in the great temple of Nature. Sublimity elevates, at the same moment that it deepens the awe and reverence which accompany, the adorations of the soul. Solitude is propitious to the humble aspirations of conscious frailty, or even of guilt, as well as to the speculations of fancy, and the search of truth. Amidst the beautiful simplicity of nature, human pride finds no objects on which to cast her scorn, and her contumely; nor can the meaner passions be there either gratified or elicited. Songs of gladness rise from a thousand warblers of the grove;—the fields spread out their sweet verdure, and smile under the rays of a genial sun;—the voice of UNIVERSAL BENEVOLENCE seems to whisper in the passing gale, and promise continued happiness from on high; whilst all around proclaims the infinite power and goodness of *Him*, who, in the beginning, spake to primeval dark-

ness, and said, "*Let there be light; and there was light.*"

At such times my attention has often been strongly drawn to the nature of animal life, and its use, under the various forms in which it is exhibited, in the creation. An inquiring mind wishes to account, as far as is practicable, for every thing it beholds, and the objects of its existence; being conscious that the perfect wisdom of God would create nothing in vain. I have fancied that my intellectual view was clearer at such times than at others; and that, on such occasions, I was enabled to perceive the relative importance of one link in the great chain of animals, to another, in a more striking light; and, also, to appreciate the duty of man towards them with more exactness. And, as I am about to treat on the lives of certain animals whose history I have conceived myself enabled to render more perfect, in a work of considerable magnitude, I consider it my duty to state a few of the reasons which should operate on the minds of practical *Zoologists*, as a check

upon the wanton, or unnecessary, destruction of any living creature, however insignificant it may appear on a slight and inconsiderate view.

It may perhaps be said, that a discourse on the iniquity and evil consequences of murder would come with a bad grace from one who was himself a murderer : and so it would : but not if it came from the lips or the pen of a repentant murderer. Who can describe that which he has not seen, or give utterance to that which he has not felt ? Never shall I forget the remembrance of a little incident which occurred to me during my boyish days—an incident which many will deem trifling and unimportant, but which has been particularly interesting to my heart, as giving origin to sentiments, and rules of action, which have since been very dear to me.

Besides a singular elegance of form and beauty of plumage, the eye of the common *lapwing* is peculiarly soft and expressive : it is large, black, and full of lustre, rolling, as it seems to do, in liquid gems of dew.


I had shot a bird of this beautiful species ; but, on taking it up, I found that it was not dead. I had wounded its breast ; and some big drops of blood stained the pure whiteness of its feathers. As I held the hapless bird in my hand, hundreds of its companions hovered round my head, uttering continued shrieks of distress, and, by their plaintive cries, appeared to bemoan the fate of one to whom they were connected by ties of the most tender and interesting nature ; whilst the poor wounded bird continually moaned, with a kind of inward, wailing note, expressive of the keenest anguish ; and, ever and anon, it raised its drooping head, and turning towards the wound in its breast, touched it with its bill, and then looked up in my face, with an expression that I have no wish to forget, for it had power to touch my heart, whilst yet a boy, when a thousand dry precepts in the academical closet would have been of no avail.

There is a passage in the works of the admirable SIR WM. JONES, which is so beautifully expressive of his opinions on

this subject, and which is so accordant with my own sentiments, that I cannot refuse myself the pleasure of giving it in his own elegant language:—

“ Could the figure, instincts, and qualities of birds, beasts, insects, reptiles, and fish, be ascertained, either on the plan of BUFFON, or on that of LINNEUS, without giving pain to the objects of our examination, few studies would afford us more solid instruction, or more exquisite delight: but I never could learn by what right, nor conceive with what feelings, a Naturalist can occasion the misery of an innocent bird, and leave its young, perhaps, to perish in a cold nest, because it has gay plumage, and has never been accurately delineated; or deprive even a butterfly of its natural enjoyments, because it has the misfortune to be rare or beautiful: nor shall I ever forget the couplet of FIRDÂUSI, for which SADÎ, who cites it with applause, pours blessings on his departed spirit.

“ Ah! spare yon emmet, rich in hoarded grain:
He lives with pleasure, and he dies with pain.”



This may be only a confession of weakness, and it certainly is not meant as a boast of peculiar sensibility; but, whatever name may be given to my opinion, it has such an effect on my conduct, that I never would suffer the *cócila*, whose *wild native wood notes* announce the approach of spring, to be caught in my garden for the sake of comparing it with BUFFON's description; though I have often examined the domestic and engaging *mayanà*, which *bids us good morrow at our windows*, and expects, as its reward, little more than its security: even when a fine young *manis* or *pangalin* was brought me, against my wish, from the mountains, I solicited his restoration to his beloved rocks, because I found it impossible to preserve him in comfort at a distance from them.

“ There are several treatises in *Arabick*, and very particular accounts of them in *Chinese*, with elegant outlines of their external appearance; but I have met with nothing valuable concerning them in *Persian*, except what may be gleaned from the

medical dictionaries ; nor have I yet seen a book in *Sanscrit*, that expressly treats of them. On the whole, though rare animals may be found in all *Asia*, yet I can only recommend an examination of them with this condition, that they be left, as much as possible, in a state of natural freedom, or made as happy as possible, if it be necessary to keep them confined*."

Peace be to the spirit of him who could inculcate such sentiments, worthy of a higher state of perfectibility than human nature hath yet generally attained! It is the language of pure benevolence flowing from the lips of a true Christian, arrayed in all the charms of simple, but yet of irresistible, eloquence. Alas! why do such men appear so seldom, to adorn, to dignify, and to exalt, the human character?

After so fine an example of mercy and benevolence, it is far from my wish to add any thing which can have the appearance of a contrary nature: but a doctrine has

* Sir WM. JONES'S WORKS, 4to. ed. vol. i. p. 153 & 4.

been held, both by poets and philosophers, respecting the sufferings of animals under bodily pain, which is so contrary to truth, and so repugnant to common sense, that I cannot forbear mentioning some very curious circumstances which occurred to a neighbour and a friend of mine, in the country, who is an excellent *Entomologist*; circumstances which incontestably prove that insects, at least, do not feel, in their destruction, “*a pang as great as when a giant dies.*”

My friend being employed one day in the pursuit of insects, caught a large, yellow, *dragon-fly* *, and had actually fastened it down in his insect-box, by thrusting a pin through the thorax, between the insertions of the wings, before he perceived that the voracious insect, which, in this class of animals, bears much the same sort of character as the hawk does amongst birds, held a small fly, that yet struggled for liberty, in its *fauces*; and, to his utter astonishment,

* *Libellula varia*. Great variegated Dragon Fly of SHAW'S *Zoology*, vol. vi. part 2. p. 242.

he saw the *dragon-fly* devour its little victim, with the coolest deliberation, and without expressing either pain or constraint: it seemed, indeed, wholly unconscious of being pinned down to a piece of cork; and, as a proof of insensibility, remained quiet, till the fly was devoured, when it immediately fluttered its wings, and made several desperate efforts to regain its liberty. Greatly surprised at this extraordinary incident, and willing to prove this accidental experiment still further, my friend caught a common *flesh-fly*, and offered it to the rapacious insect, held down as it was by a large pin thrust through its body. It immediately ceased to flutter, and, applying its *fauces* to the unfortunate fly, devoured it with the same celerity, and with as much greediness, as before: and when the repast was over, it made the same violent efforts to regain its freedom, apparently unmindful, or careless, of the awkward predicament in which it was placed.

Happening to mention this fact to Mr. HAWORTH, of Little Chelsea, the celebrated

*Entomologist**, he not only confirmed the truth of the remarkable insensibility to pain manifested by most insects, but related a circumstance in which an insect of the same species was concerned, that seems to be still more extraordinary: but, resting on such respectable authority, the fact may be deemed indisputable.

It chanced one day, that, being in his garden with a friend who firmly believed in the delicate susceptibility of insects, a large *dragon-fly* settled upon the leaf of a plant near them. Glad of so favourable an opportunity of convincing his friend, Mr. HAWORTH struck at the insect, and knocked it down; but, unfortunately, with such violence, that the abdomen—which is the long, tail-like, part of the animal—was separated from the thorax, to which it is attached by a very delicate tube, so that the luckless insect was severed in two parts. Whilst

* The supposed cruelty of *Entomological* pursuits is discussed and refuted in a very able and satisfactory manner by this learned and indefatigable gentleman, in his excellent work entitled "*Lepidoptera Britannica*,"

fluttering in his hand, in this mutilated state, Mr. HAWORTH caught a small fly, and presented it to the *fauces* of this voracious insect. The prey was instantly seized and devoured : a second fly was caught and presented in a like manner, and was as instantly destroyed. But this was not all : to convince his friend still further, Mr. HAWORTH contrived to make a false abdomen, by means of a slender filament taken from a *geranium*, and to affix it to the thorax of the *dragon fly*, which alone remained perfect. In this patched-up state another fly was offered, accepted, and devoured with the same greediness as before, the insect continuing to appear wholly unconscious of having suffered any mutilation or injury ; and, when set at liberty, it flew away with the false abdomen with as much apparent glee as though it had suffered no loss, and notwithstanding its life would inevitably soon fall a sacrifice.

I believe it is a well-known fact to most practical *Entomologists*, that pins may be driven through some of the large bodied

moths as they are found asleep in the woods, during the day-time, without occasioning pain sufficient even to awaken them ; and the same intelligent *Naturalist*, whom I have just named, has informed me, that nothing is more common than for an *Entomologist* to transfix four, or five, large moths, one after the other, in this way, as they sleep upon the leaves, or on the trunks, of trees ; and that, when thus impaled, they do not often move until they are lifted from their resting places, by means of the pin, and find themselves suspended in the air, they know not how. Nay, so extraordinary is the nature of existence in this tribe of animals, that a large *goat-moth*, which had been taken, and pinned down to a cork, actually lived, and was vigorous, for the space of two entire days *after its head had been eaten off by a mouse*.

These experiments are of a nature to be tried by any one who may have the necessary curiosity ; but, unless some useful and sufficiently important results are expected, they cannot be deemed justifiable. It is, how-

ever, a subject of very interesting inquiry to investigate the cause of this remarkable insensibility to the feeling of pain; and it would be an object worthy the attention of an enlightened Naturalist to examine, whether it is occasioned by some peculiar organization of the insects, or it may be attributed to a more imaginary, though surely not a less pleasing or satisfactory cause; namely, that as all the tribes of insects yet known constitute the food of some other animals, and, consequently, are doomed from their birth to a violent death, the UNIVERSAL PARENT, in mercy, has decreed that they shall not be subject to those pangs which, in mutilation or death, torture animals of more complicated organization, and of more delicate and sensitive nerves.

I have not related these anecdotes with any view of attempting to prove that we may tyrannize over the life even of the most insignificant and insensible creature, according to the wantonness of our pleasures, or the vagrancy of our inclinations; but merely to shew the absurdity of an opinion

very frequently, and very generally, entertained, that all animals suffer the same degrees of pain under similar privations, or modes of torture; a notion that is wholly unfounded in truth. The various degrees of intensity of pain evidently depend upon the nature of the organization of the animal under suffering, as to the quality of the blood,—the number and fineness of the vessels,—and the delicacy of the nerves.

If it be true that nothing has existence whose circle of action could be spared without fatal injury to the whole system of creation;—a position that may be proved both by facts and analogy;—there are two powerful reasons why it should be our solemn and sacred duty, to abstain from the wanton destruction of any animal whatever; and they cannot be too forcibly impressed, or too deeply felt.

One of these reasons is founded on the duty we owe to that OMNIPOTENT and MERCIFUL BEING from whom we have received existence, and that distinguished station in the great scale of animal life we

enjoy ; a duty that should lead us, as far as we can comprehend them, to assist, to the best of our poor endeavours, rather than to thwart, *His* vast and benevolent designs, by the fullest exercise of our faculties, and the best modes of exerting our free-agency. The other rests upon an obligation which ought to be held equally sacred : this is the duty we owe to the finer feelings of the heart ; those feelings and sympathies by which we are connected and bound to each other ; and on whose protection, delicacy, and acuteness, depend the fulfilment of all the great charities of life, and the sum of our earthly felicity.

The wise Athenians, though strangers to the refined and exalted doctrines of *Christianity*, were so sensible of these obligations, that they instituted a tribunal in the celebrated court named the *Arcopagus* * ; a prin-

* This court was very ancient in *Greece*, being instituted long before the time of *SOLON*. It was highly respected, and its decrees much dreaded. Its objects were various, though murder received its heaviest punishments. The magistrates belonging to it sometimes amounted to the number of three hundred.

cipal object of which was, to punish those who were guilty of cruelty to animals: and so severe were its decrees, that a child was actually condemned to suffer death for having amused itself by putting out the eyes of *quails*. This sentence was given on the principle, that so cruel and sanguinary an inclination was an infallible proof of a wicked disposition, which, if suffered with impunity, might one day prove injurious to the state*.

In fine, whatever opinions may be held on the subject of this chapter, it is certain that learning and science are dearly bought, if acquired at the expense of that humanity which is assuredly more necessary than either, on our road through life.

“ Life animal is nurtur'd by the sun;
Thrives on his bounties, triumphs in his beams.
Life rational subsists on higher food;
Triumphant in his beams who made the day.”

* QUINTILLIAN, l. v. c. 9. ROLLIN's *Antient History*.

CHAP. VII.

Man considered as the Vicegerent of God upon Earth. Some of his Duties connected with a Knowledge of the Nature of Animals. How far Inferior Creatures have been created for the Use of Man. On the Relations which Animals bear to each other, and the Checks which restrain their Numbers within due Limits.

MAN has evidently been created the vicegerent of God upon earth: and to him has been given the management, direction, and improvement, of all that it contains, save of the elements, of the seasons, and of those general, secret, and inherent laws, which are necessary for the well-being, and indispensable to the government, of the world; and which, if committed to the hands of one less perfect than the Divinity, might be affected by his frailty, and rendered liable to the most fatal disasters. His duties, then, are of the highest and most glorious nature:

and, under such a conviction, he will not stand, like an idiot, asking the silly and impious question, "*Why he was created?*" but will immediately set about the business of his sublime and immortal career. It is neither in his natural, nor in his depraved state, however, that man is capable of comprehending the grand designs of OMNIPOTENCE concerning himself; for, as an eminent philosopher of these times has well observed, "a state of sloth, and not of restlessness and activity, seems evidently to be the natural state of man: and this latter disposition could not have been generated but by the strong goad of necessity; though it might afterwards be continued by habit, and the new associations that were formed from it, the spirit of enterprise, and the spirit of glory*." It is only when his mind is improved and enlightened by the aid of science and the study of nature, and his heart is softened by the feelings of benevolence, that he can have any conception of the

* MALTHUS on *Population*, 3d ed. vol. i. p. 110.

grand scheme of creation, or the extent of his own powers.

In those moments of despondency, indeed, which man is heir to, when the darkness of imperfect vision, and the weakness of his frailty, are upon him, moments that visit alike the palace and the cottage, he may be inclined to imagine that he was created merely for the sport of some wonderful, incomprehensible, Power; seeing that he is continually played upon by outward circumstances, over which he has little or no control; and, that all animated bodies, together with his own, have within them the principles of certain and irremediable decay, from which there is no possibility of escape; and, that reflections on his own past life, and a contemplation of the history of nations, only serve to prove how vain are all the prospects of any continued happiness, or perfectibility, in this state of existence!

But he who gains the heights of pure virtue, and true philosophy, leaves the pains of anxiety, and the gloom of despondency, far behind him; his eye is fixed

on the sun of truth, and his heart leaps with the excess of its joy; and, even though it may not be in his power wholly to escape from the region of doubt and error, still one would imagine, that as man cannot clearly see nor demonstrate any thing, much less the first cause and final object of his being, he should not spend his few transitory hours in seeking to know what must for ever remain hid from mortal ken; but, endeavouring to obtain all the knowledge the measure of his ability and extent of his faculties will permit, patiently and humbly wait till the veil, which at present darkens his vision, shall be rent, and the wonders of creation explained by a nearer approach to the DIVINITY. In the mean while it seems reasonable to conclude, that unless a man endeavours to render himself worthy of higher attainments in a superior state of existence, by employing his time here, in this dawn, this opening, of life, in the investigation of truth, and in the practice of virtue; it can scarcely be supposed that his soul will be sufficiently expanded or fitted

to receive the fulness of wisdom, and the perfection of knowledge, after death.

Viewing man as the vicegerent of God upon earth, both in regard to his relations with other animals, and to the cultivation and utmost improvement of the land which has been given to him for an inheritance;—a view of the subject which the study of *Natural History*, in its most extended limits, and if rightly pursued, can scarcely fail to give, it must be allowed that he can never fully comprehend his various duties, and the extent of his power, in the creation; as ~~Lord~~ of the whole, until he has ascertained the true nature of animals, and the properties of natural bodies. His greatest happiness will then consist in his endeavours to resemble the DIVINE ORIGINAL to the fullest extent of his power, by putting in practice the benevolence of *His* nature, and by using all the means that are given him for wise and useful purposes.

How far all inferior animals have been created, or expressly formed, for the use of man, a doctrine that has been pretty gene-

rally held amongst the weak and vain, seems to be very doubtful, even on a superficial view ; since there are numberless creatures in the air, in the forests, and in the unknown depths of the ocean, with which, apparently, he can never come in contact ; and which, consequently, can scarcely be said to have been made for his own *immediate* use, though, *remotely* they may, as distant links of a chain, which, if broken in any part, would be destroyed ;—and, that one animal is so connected with another, whether immediately apparent or not, as not to admit the loss or extinction, even of the most insignificant, is a truth no one will be able to deny.

It is in considering the relations which animals bear to each other, that the enlightened *Naturalist* may expect to derive some of the most important instruction, and his chief delight. It is a matter of astonishment, that a subject so full of interest should have, hitherto, received so little elucidation ; for it is in the study of these relations, alone, that we can expect to discover the

use of the different species of animals in the creation.

Nothing can afford a finer illustration of the beautiful order and simplicity of the laws which govern the creation, than the certainty, precision, and regularity, with which the natural checks on the superabundant increase of each tribe of animals are managed; and every family is subject to the operation of checks peculiar to that species, whatever it may be, established by a wise law of the MOST HIGH, to counteract the fatal effects that might arise from an ever-active populative principle: and it is by the admirable disposition of these checks, the contemplation of which is alone sufficient to astonish the loftiest and most comprehensive soul of man, that the whole system of animal life, in all its various forms, is kept in due strength and equilibrium.

This subject is worthy of the *Naturalist's* most serious consideration; as, by a few hints, I will now attempt to shew.

The power, or principle, of increase, in respect to animal life, being kept down to

the means of subsistence ;—a doctrine which has so lately, and in our own country, received such ample illustration from the pen of the enlightened MALTHUS ;—is so incontrovertibly true, and so universal in respect to all other animals, as well as to man, that it may be considered as a remarkable circumstance it should have remained so long without illustration and application : the more especially as it is no new doctrine ; for this truth has been known to the philosophers of almost every age since the days of ARISTOTLE and PLATO ; though it was reserved for MALTHUS to collect together, and condense, the scattered light on this subject, into one splendid and irresistible focus.

It may be granted, however, that this excellent writer is a little too frigid and mathematical when he has occasion to touch upon human passions and their gratification ; and, that he is a very cool lawgiver to feelings that most men find very difficult to put under such strict moral restraint as this great philosopher sometimes deems ne-

cessary, in order to avoid greater evils. It must not, however, be forgotten, that it is mathematical law which governs the universe; and, that truth is not always gratifying to us!

But it is really surprising, in this day of increased light and knowledge, that any set of men can be found, who, making pretensions to the philosophical character, are so blind, or so foolish, as to deny the truth of the main principle,—that all animals, including the lord of the creation himself, are, in respect to numbers, kept down, as they must infallibly be, to the means of subsistence: yet many such there are. “*The great law of necessity, which prevents population from increasing in any country beyond the food which it can either produce or acquire, is a law so open to our view, so obvious and evident to our understandings, that we cannot for a moment doubt it*.*”

This great law pervades and affects the

* MALTHUS'S *Essay on the Principle of Population*, &c. 8vo. 3d ed. vol. ii. p. 68.

whole animal creation; and, so active, unwearied, and rapid, is the principle of increase over the means of subsistence, amongst inferior animals, that it is evident whole genera of carnivorous beings amongst beasts, birds, fish, reptiles, and insects, have been created for the express purpose of suppressing the redundancy of others, and restraining their numbers within proper limits. But even those checks are insufficient to restrain the effects of a too rapid populative principle in some animals, which have therefore certain destructive propensities, given to them by the CREATOR, that operate powerfully upon themselves and their offspring, as may be particularly observed in the natural history of the *rabbit*, but which is still more evidently and strikingly displayed in the life and economy of the *rat*.

It has been calculated, and there can be no doubt of the truth of the statement, that the astonishing number of *one million, two hundred and seventy-four thousand, eight hun-*

dred and forty individuals*, may be produced from a single pair of *rabbits* in the short space of four years; as these animals, even in their wild state, breed seven times in a year, and generally produce eight young ones each time. They are capable of procreation at the age of five or six months, and the doe carries her burthen no longer than thirty days.

But the principle of increase is much more powerful, active, and effective, in the common grey rat, sometimes called the *Norwegian rat* (*mus decumanus* LINN.), than in any other animal of equal size.

This destructive quadruped is continually under the *furor* of animal love. The female carries her young for one month only; and she seldom, or never, produces a less number than *twelve*, but sometimes as many as *eighteen*, at a litter: the medium number may be taken for an average; and the period of gestation, though of such short continu-

* PENNANT'S *Quadrupeds*, vol. ii. p. 104, 3d ed. also BEWICK'S *Quadrupeds*.

ance, is confined to no particular season of the year. The embraces of the male are admitted immediately after the birth of the vindictive progeny; and it is a fact, which I have ascertained beyond any doubt, that the female suckles her young ones almost to the very moment when another litter is dropping into the world as their successors.

A celebrated Yorkshire *rat-catcher*, whom I have occasionally employed, one day detected, and killed, a large female rat that was in the act of suckling *twelve* young ones, which had attained a very considerable growth; nevertheless, upon opening her swollen body, he found *thirteen* quick young, that were within a few days of their birth. Supposing, therefore, that the *rat* produces ten litters in the course of a year, and that no check on their increase should operate destructively for the space of four years, a number not far short of *three millions* might be produced from a single pair in that time!

Now, the consequences of such an active and productive principle of increase, if suf-

ferred continually to operate without check, would soon be fatally obvious. We have heard of fertile plains being devastated, and large towns undermined, in Spain by *rabbits*; and even that a military force from Rome was once requested of the great AUGUSTUS* to suppress the astonishing numbers of the same animals, which overran the islands of Majorca and Minorca: but, if *rats* were suffered to multiply without the restraint of the most powerful and positive natural checks, not only would fertile plains and rich cities be undermined and destroyed, but the whole surface of the earth in a very few years would be rendered a barren and an hideous waste, covered with myriads of famished *grey rats*, against which man himself would contend in vain.

But the same ALMIGHTY BEING, who perceived a necessity for their existence, has also restricted their numbers within proper bounds, by creating to them many very powerful enemies; and, still more effect-

* Recorded by PLINY.

ually, by establishing a propensity in themselves, the gratification of which has continually the effect of lessening their numbers, even more than any of their foreign enemies. The male rat has an insatiable thirst for the blood of his own offspring: the female, being aware of this passion, hides her young in such secret places as she supposes likely to escape notice or discovery, till her progeny are old enough to venture forth and stand upon their own energies: but, notwithstanding this precaution, the male *rat* frequently discovers them, and destroys as many as he can: nor is the defence of the mother any very effectual protection, since she herself sometimes falls a victim to her temerity and her maternal tenderness. It is well known that *rabbits* have the same trait in their character, though, perhaps, not in an equal degree of force.

Besides this propensity to the destruction of their own offspring, when other food fails them, *rats* hunt down and prey upon each other with the most ferocious and desperate

avidity ; insomuch, that it not unfrequently happens, in a colony of these destructive animals, that a single male, of more than ordinary powers, after having overcome and devoured all competitors with the exception of a few females, reigns the sole, bloody, and much dreaded, tyrant over a considerable territory, dwelling by himself in some solitary hole, and never appearing abroad without spreading terror and dismay, even amongst the females whose embraces he seeks.

In this relentless and bloody character may be found one of the most powerful and positive of the checks which operate to the repression of this species within proper bounds ; a character which attaches, in greater or less degree, to the whole *mus* genus, and in which we may readily perceive the cause of the extirpation of the old *black rats* of England, (*mus rattus* LINN.) for, the large grey rats having superior bodily powers united to the same carnivorous propensities, would easily conquer and destroy their *black* opponents

wherever they could be found, and whenever they met to dispute the title of possession, or of sovereignty.

For want of taking enlarged and general views, authors occasionally write absurdly. Wood, in his *Zoography*, when detailing some interesting particulars in the Natural History of *scorpions*, observes—
“They will attack each other with fury if confined in the same glass, and the survivors will devour the conquered. They carry their *unnatural* temper to a still greater length, and even devour their young, if confined during the time of bringing forth. This *unnatural* propensity was observed by a celebrated French philosopher, who kept one of these animals enclosed in a glass, and saw the young ones devoted to destruction, one after another, till they were all reduced to a single scorpion, which would certainly have shared the same fate, if it had not fortunately taken refuge on the back of the mother, where it increased in size till it was strong enough to become the aggressor in its turn, and kill the old one.”

This is a curious and an interesting anecdote, and worth preserving, as a striking illustration of the manner in which one of the checks on the increase of this tribe of animals is allowed to operate, being of a similar nature to what I have already described in respect to the common *rat*. But, for a *Fellow of the Linnean Society* to call a propensity given by Nature for the wisest purposes, and over which the animal itself has, probably, little or no control, *unnatural*, is most preposterous! It is the cant of a nursery, rather than the language of philosophy!

The strong law of necessity may occasion animals to do many things, from which in their natural state they would refrain. On such ground alone can the assertion of BOSWELL * be proved or accounted for, when he declares that he has, in Italy, several times seen *scorpions*, when surrounded with fire, so as to be prevented from all escape, retire into the centre of the circle,

* See his *Life of Johnson*, vol. i. p. 513.

and put an end to their existence, by committing suicide with their own stings. If this bold assertion is to be believed, it can only be accounted for on the ground of necessity, or that sudden despair and desperation so frightful a situation might be supposed to occasion. But the fact of scorpions devouring their own offspring is to be accounted for by one of the wisest and most beneficial laws of Nature: and no animal has greater reason to be thankful for the operation of such checks on the increase of creatures that are personally obnoxious, than man himself.

Thus may it be shewn, by a few of the numberless illustrations which might be taken from the Natural History of Animals, in what manner some of the checks on the superabundant increase of locomotive, living, creatures, operate. Another of these checks, and scarcely less active or powerful, must be sought for in the manners and propensities of all animals of prey, or those which support existence by the destruction of others not of their own species.

It is the great duty, and the sublime pleasure, of *Natural Philosophy*, to read the designs and profit by the wisdom of the CREATOR, as displayed in *His* works; and one of the results of such an employment of our time will certainly be the conviction that there is no animal, at present known to man, which is not subject to the operation of very powerful checks on its increase, that are established either by some inherent quality, or propensity, or by the destiny of some other animal which continually leads to its destruction. In general, the more harmless—or what *we call harmless*, because not ferocious—and useful animals are the most numerous; and those whose nature is carnivorous, or wholly destructive, are less plentiful.

It has already been observed by an enlightened writer, that the germs of existence which are contained in this earth, if allowed freely to develop themselves, “would fill millions of worlds in the course of a few thousand years.” It is by this profuse distribution of the seeds of life, and

the unwearied activity of the populative principle, that the innumerable families of living beings we behold are maintained on the surface of the earth; but it must be evident to the meanest capacity, that the most horrid uproar, confusion, and famine, would soon prevail, if no bounds were put to the increase of animal life; and he who attentively examines the relations which animals bear to each other, will not only be able to discover the nature of those bounds, and the various checks which mark them out, but will attain the most valuable and interesting knowledge which the study of Natural History can impart, *the uses of different animals in the creation*; a subject on which I shall briefly touch in the following chapter.

CHAP. VIII.

On the Utility of different Animals in the Creation. Locasts. Mosquitoes. Ostrich. Hints to Explain the Principle of Action in Animals; which, having no Responsibility, can have no Blame.

If we could discover the use of every animal in the creation, we should gain a very clear insight into the grand designs of the ALMIGHTY, respecting creatures inferior to ourselves; and perceive the immediate cause, or necessity, of their existence, and how far we have a right to interfere with their economy. That man should ever attain the whole extent of this knowledge, in this state of existence, can scarcely be hoped for; but, that he may learn much, there can be no doubt.

Because the utility of some animals, in a general view, is not palpably obvious, we ought not pettishly or hopelessly to give up

the inquiry. Some of the most numerous are, *apparently*, the most noxious, and the least useful, as the *locust* (*gryllus migratorius*), for example. It has never been my fortune to visit countries subject to the devastations of these insects; and the travellers who describe them, seem, either through want of inclination, or astonishment at the desolating effects produced by their incursions, unable to give those facts which an industrious and attentive Naturalist, with enlarged views, might collect and apply to some useful purpose; for there can be no doubt that INFINITE WISDOM would not have permitted these insects to be so numerous as they are, if their existence was not absolutely necessary. Of the myriads of these insects, and the effects produced by them, some idea may be formed from the following lively description, by one of the most intelligent and accomplished travellers of modern times*.

“ We now began to perceive the truth of

* Dr. CLARKE.

those surprising relations which we had heard and read concerning the *locust* in countries infested with that insect. The *steppes* (of the south of Russia) were entirely covered by their bodies; and their numbers falling resembled flakes of snow carried obliquely by the wind, and spreading a thick mist over the sun. Myriads fell over the carriage, the horses, and the drivers. The stories of these animals told us by the Tartars were even more marvellous than any we had before heard. They said that instances had occurred of persons being suffocated by a fall of locusts in the *steppes*. It was now the season, they further added, in which their numbers began to diminish. When they first make their appearance, a thick dark cloud is seen very high in the air, which, as it passes, obscures the sun. I had always supposed the stories of the locusts to exaggerate their real appearance, but found these swarms so astonishing in all the *steppes* over which we passed in this part of our journey, that the whole face of nature might have been described as concealed

by a living veil. They were of two kinds, the *gryllus tartaricus*, and the *gryllus migratorius*, or common migratory locust. The first is almost twice the size of the second; and, since it precedes the other, bearing the name of the *herald* or *messenger*. The migratory locust has red legs; and its inferior wings have a lively red colour, which gives a bright fiery appearance to the animal, when fluttering in the sun's rays. The strength of limbs possessed by it is amazing: when pressed down by the hand upon a table, it has almost power to raise the fingers: but this force resides wholly in the legs; for if one of these be broken off, which happens by the slightest accident, the power of action ceases. There is yet a third variety of locust, *gryllus viridissimus* of LINNEUS, found near the Don and the Kuban, which is entirely of a green colour. This last I have since seen upon the banks of the Cam, in my own country, and felt for the moment intimidated, lest such a presage should be the herald of the dreadful scourge which the locust bears wherever it abounds. On

whatever spot these animals fall, the whole vegetable produce disappears *. Nothing escapes them, from the leaves of the forest to the herbs of the plain; fields, vineyards, gardens, pasture, every thing is laid waste; and sometimes the only appearance left upon the naked soil is a disgusting superficies caused by their putrefying bodies, the stench of which is sufficient to breed a pestilence †."

* "In the year 593 many countries were afflicted by famine, in consequence of ravages committed by locusts. In 677, Syria and Mesopotamia were overrun by them. In 852, they migrated from the eastern countries; and, after devastating whole regions in the West, were driven by winds into the Belgic Ocean. In 1271, all the corn near Milan was destroyed by them; and in the year 1339, all the fields in Lombardy were laid waste. In 1541, they penetrated to Poland and Wallachia; in 1673, some swarms settled in Wales; and in 1748, fell in several parts of England, particularly in the neighbourhood of London."

SHAW's *Zoology*, vol. vi. part i. p. 136 & 7.

† The best method of destroying them would be to recommend them as an article of food. In the Crimea, they are often eaten by the inhabitants. Some French emigrants, who had been directed in this manner, assured me, that

The accounts which Dr. SHAW gives us of the prodigious numbers, and the ravages, of this insect, in his Travels into *Barbary* and the *Levant*, are of a similar nature. But it is really surprising that two men of such high philosophical character, witnesses of the extraordinary effects produced by these insects, should make no attempts to shew the causes of their origin, and their use in the regions they frequent: a task that might be difficult, indeed, but by no means of impossible completion, if the inquirer was attentive to the true principles of Natural Philosophy.

It is quite certain that nothing is given, or endued by Nature with peculiar functions, in vain; and it is equally certain, that matter, however modified, whether in the form of animated or inanimated bodies, is continually undergoing change. The more

when fried they were very palatable and very wholesome. The Arabs, according to HASSELQUIST, eat them roasted, and are glad to get them."

Dr. CLARKE's *Travels in Russia*, p. 438.

deeply we investigate the works of creation, the more strong will be our conviction of these truths. We know that many animals, and particularly insects, have no other employment, exclusive of the business of generation, than that of clearing or purifying the surface of the earth of superfluous matter, the residuum of decayed bodies, or of reconverting it into useful forms, as I shall attempt to illustrate hereafter. Now, if we survey those regions which give birth to, and support, the vast clouds of *locusts* alluded to, our view will be confined principally to the extensive deserts of *Africa* and *Asia*; the vegetation of many of which, according to the reports of travellers, is abundant and luxuriant beyond the conception of those who have not beheld them; insomuch, that the crops of grass, and other annual vegetables, absolutely load the earth; and these, perishing upon each other, would form an impenetrable, putrid, mass, if not consumed by some animals appointed for the purpose.

That *locusts* support existence by vegetable food, is well known; but, whether they have no other object than to consume the superabundant produce of the regions they frequent, and to procreate, is not so easily proved. One who has had no opportunity of witnessing their manners, from their birth to their final destruction, can scarcely be able positively to decide; but I have no doubt that an intelligent Naturalist, (governed by the principles this chapter is intended, in some measure, to illustrate,) with the necessary opportunities, such as Dr. SHAW, in particular, had, would be able to get at facts that would indisputably prove the existence of *locusts* to be a blessing rather than a curse. Whatever may be the direct object of their existence, *locusts* are of great use to many other animals; for there are some, particularly birds, that entirely prey upon them; and, if man himself refuses this food, it is rather from the prejudice, perhaps, of an absurd education, than from any improper or bad quality of

the food itself*. The inhabitants of several eastern nations have a relish for this diet: and it is recorded of him who cried in the wilderness, "*Prepare ye the way of the Lord, that his meat was locusts and wild honey†.*" After this, we cannot listen to the feeble remonstrances of any modern epicure.

Next to the *locust*, the *mosquitoe* may be mentioned as one of the most noxious and the most numerous of insects; at least of such as are esteemed noxious by the vulgar and the ignorant. In some countries, indeed, their numbers, and the effects produced by them, are wonderful. I know of no instance so striking as one related by the same Dr. CLARKE‡ whom I have al-

* SHAW says that the *gryllus cristatus*, which is five or six times the size of the common locust, or *gryllus migratorius*, is publicly sold, both in a fresh and salted state, in the markets of some parts of the Levant.—*Gen. Zoology*, vol. vi. part ii. p. 138.

† Matthew, chap. iii. ver. 4.

‡ In his *Russian Travels*, p. 387, &c.

ready quoted, who, upon one occasion, observes :

“ No contrivance on our part could prevent millions of mosquitoes from filling the inside of our carriage, which, in spite of gloves, clothes, and handkerchiefs, rendered our bodies one entire wound. The Cossacks light numerous fires to drive them from the cattle during the night; but so insatiate is their thirst of blood, that hundreds will attack a person attempting to shelter himself even in the midst of smoke. At the same time, the noise they make in flying cannot be conceived by persons who have only been accustomed to the humming of such insects in our country.”—“ Almost exhausted by fatigue, pain, and heat, I sought shelter in the carriage, sitting in water and mud. It was the most sultry night I ever experienced; not a breath of air was stirring; nor could I venture to open the windows, though almost suffocated; through fear of the mosquitoes. Swarms, nevertheless, found their way to my hiding

place; and, when I opened my mouth, it was filled with them. My head was bound in handkerchiefs; yet they forced their way into my ears and nostrils. In the midst of this torment, I succeeded in lighting a large lamp over the sword-case; which was instantly extinguished by such a prodigious number of these insects, that their dead bodies actually remained heaped in a large cone over the burner for several days afterward: and I know not any mode of description which may better convey an idea of their afflicting visitation, than by simply relating this fact: to the truth of which, those who travelled with me, and who are now living, bear indisputable testimony."

Those who have laboured under so painful a visitation as that to which this lively account refers, may not, perhaps, be so ready to admit the general utility of these irritating insects, though their usefulness is more evident, and far more easily proved, than that of the *locust*, or, indeed, of most other animals. Bred in the midst of the stagnant pools, the bogs, and marshes, of regions

unwholesome to man ; and where the effluvia arising from animal bodies, and from rank, decaying, vegetable substances, are so abundant as soon to form thick pestilential vapours, that would prove almost instantaneously destructive to man, and most other creatures, if not removed as quickly as they were formed ;—bred in such regions, and gifted with functions and propensities directed to the proper ends, the *mosquitoe* supports its existence by consuming the noxious particles exhaled from the swamps, and the bodies of animals, as rapidly as they are generated, thereby preventing that horrible putrefaction of the air, and consequent pestilence, that would infallibly take place if the *mosquitoes*, and insects of a similar nature, were not employed to purify the atmosphere.

It is proved by all travellers, that the vast deserts of *Asia* and *Africa* are most frightfully destitute of animated objects. SHAW observes: “ Perhaps there are no places in the whole world that abound less with living creatures than these deserts ; and, indeed,

where has Nature made less provision for their sustenance*?" The learned author might very well have left out the words *perhaps* and *indeed*; the latter part of this passage fully and sufficiently accounting for the first. Yet, barren and inhospitable as those melancholy wastes appear to the anxious eye of the weary traveller; they, too, have their inhabitants, that would be unhappy, and probably cease to exist, in other situations.

It is one of the most evident designs of Almighty power, that no part of the globe should be utterly destitute of inhabitants to interest, to enliven, and adorn; for even these horrible solitudes afford sustenance, and give protection, to animals, adapted to their nature; and there is no subject more interesting to the *Naturalist*, and likely to produce more beautiful illustrations of Divine Wisdom, than an inquiry into the peculiar characters of the creatures appointed to such modes of existence as can alone be

* Page 449 of his *Travels into Barbary and the Levant*.

permitted in those extensive and dreary wastes.

The *ostrich*, in particular, having been destined to fulfil the designs of its creation in the midst of deserts whose burning sands have scarcely felt the impression of any other foot, presents to our view one of the most extraordinary characters of animal life.

Although the learned SHAW has related some very curious and striking facts in the natural history of this singular bird; his manner of treating the subject, and the terms he uses, evidently shew that he was not accustomed, or not able, to take any wide or general views; and that his notions are at variance with sound philosophy. He relates the following particulars :

“ She (*the ostrich*) is likewise inconsiderate and foolish, in her private capacity; particularly in the choice of food, which is frequently highly detrimental and pernicious to it: for she swallows every thing greedily and indiscriminately; whether it be pieces of rags, leather, wood, stone, or

iron. When I was at *Oran*, I saw one of these birds swallow, without any seeming uneasiness or inconveniency, several leaden bullets, as they were thrown upon the floor, scorching hot from the mould :—the inward coats of the *oesophagus* and *stomach* being probably better stocked with glands and juices, than in other animals with shorter necks. They are particularly fond of their own excrement, which they greedily eat up, as soon as it is voided. No less fond are they of the dung of hens and other poultry. It seems as if their *optic*, as well as their *olfactory* nerves were less adequate and conducive to their safety and preservation, than in other creatures. The *Divine Providence* in this, no less than in other respects, having deprived them of wisdom, neither hath it imparted to them understanding*.”

It is remarkable that such rash and erroneous conclusions could have been drawn from facts so extraordinary by any one making pretensions to the philosophical

* *SHAW'S Travels*, p. 458.

character. But there are many other passages of a similar tendency in the very interesting and learned work to which I have referred. Such, however, is the kind of cant language generally used in the inferences of those who are either afraid, or incapable, of pushing the ardour of philosophical inquiry into subjects that are, in *appearance* only, for in reality they are far otherwise, paradoxical with the wisdom of God; a language that should not have been used by so distinguished a scholar, and so respectable a philosopher, as Dr. SHAW.

As to the poor *ostrich* being either *inconsiderate*, or *foolish*, it must be evident that she can be nothing else than what she was designed to be by the CREATOR;—to be either one, or the other, implies the abuse of a power which the bird has not. Necessity, undoubtedly, governs those creatures who have no other mental attributes than those of, what we understand by the term, *instinct*; however it may influence animals with greater pretensions to free-agency, and the faculty of reason. Instinctive beings,

or creatures with very limited faculties of mind, cannot act contrary to the direction of those faculties, which appear to be governed by a secret, inexorable, law, that confines their motions and desires to the circle of their peculiar destinies. They can, therefore, do no wrong. Not having general *free-will*, their actions must be charged to the account of the directing power within them, or that guides by the operation of external objects and circumstances, whatever may be their tendency; and who shall have the impious boldness to attach *folly* and *indiscretion* to *Him* that “*tempers the wind to the shorn lamb of the mountains?*”

As to those singular propensities to food, that would probably destroy, rather than support, any other animal, which Dr. SHAW has touched upon with his usual ability, though certainly without having any correct or enlarged views of his subject, they merely point out the peculiar destiny of the bird; and shew, with indisputable clearness, what part in the creation it has been ordained to fulfil.

It seems evident, that one of the great designs of the CREATOR concerning this globe, is, that nothing should be lost; or, in other words, that, amidst those changes of matter which are continually taking place, all substances, both animated and inanimated, should become agents of good to the whole, either in their own immediate character, or when incorporated with some other body of greater importance. Thus, abstractedly, there are many substances which appear of little use, value, or importance, whilst in their simple, individual, character; but, when incorporated with other bodies, they become extensive agents of good: and in none is it more strikingly apparent than in the excrement of animals, and those offal substances which are ranged under the general term of *manure*. Nothing can appear more odious, disgusting, and useless, on a slight and superficial view, than the dung of a carnivorous animal. It is already the *residuum* of a substance from which all that was nourishing and seemingly contributory to the support

and growth of another body has been extracted; and one would imagine that it could no longer be of use. But how different is the true state of the case, is known even to the most ignorant.

The insatiate and indiscriminate appetite which has been noticed in the *ostrich*, shews that the bird was destined to subsist in situations where choice of food could not be indulged, and that it was necessary for the substances on which it preys to be turned to some account by means of this bird. We may be assured that neither *iron* nor *lead* constitutes any part of the *food* of the *ostrich* in its native wilderness; not only because no nourishment could possibly be derived from those substances, but because it cannot be supposed the bird, when at large, would ever meet with them. Being swallowed by this animal in a tame, domesticated, or confined state, proves nothing further than that it is a most indiscriminate feeder; and, if it was not an indiscriminate feeder, and were not provided with the necessary internal organs, the poor

creature must soon perish in those boundless wastes, the regions of famine, horror, and death, to most other animals, which God hath appointed for the scene of its existence.

The learned and ingenious Sir THOMAS BROWN*, in his exposition of "*Vulgar Errors*," was one of the first to deny, or at least to doubt, that *ostriches* had the power of digesting iron. It has since been proved, as he suspected, that not only *iron*, but all the substances swallowed by this bird, which the stomach has not power to soften, pass

* Methinks if BROWN had taken equal pains to refute *all* the errors of the antients in *Natural History*, as he has done to expose *some* of them, he would have left us many such folios as that eccentric volume entitled "*Enquiries into Vulgar and Common Errors*." Besides being a man of most extensive reading and profound learning, he was a shrewd critic, and was possessed of a genius so penetrating and acute, that he rarely touched upon any subject, however dark and obscure, without illuminating it with the rays of his intelligence. His works, though somewhat quaint and dogmatical, are of that valuable class which are likely to stand the shock of time for many ages yet to come. They are calculated to render men wiser and better than they are.

through the body with little or no alteration. On dissection, such an amazing quantity of heterogeneous matter has been discovered, as to render it almost inconceivable how the quantity could have been either collected or digested. In the first stomach of one of these birds, VALISNIERI found a wonderful mixture of incongruous substances, *grass, stones, nuts, cords, brass, copper, iron, tin, lead, glass, and wood*; amongst which was a stone that weighed more than a pound. It is probable that many of these hard substances are swallowed to *aid* digestion, as pigeons and common poultry pick up small pebbles for the same purpose. But this propensity to indiscriminate and foul feeding must sometimes produce fatal effects; as, indeed, has been proved in an instance related by VALISNIERI, who declares that he saw an *ostrich* killed in consequence of devouring a quantity of quick lime. Even such a fact, however, cannot be admitted as a ground of accusation against the wisdom which marked out the destinies of this bird; since, according to

a doctrine already explained in a preceding chapter, this liability to swallow pernicious substances may operate as one of the natural checks on the too rapid increase of the species, which, like all other animals, must be kept within due bounds.

After all that has been observed, it must, I think, appear evident, that the utility of the *ostrich* depends, in a very principal degree, on the gratification of those very propensities for which it has been so often accused; and, if we were better acquainted with all its modes of life, whilst wandering at large in its native freedom and in the midst of its dear solitudes, we should have still greater reason for believing such an assertion: as it is, we may rest assured, that in the course of its indiscriminate feeding it must destroy both what might prove noxious to other animals and substances, which, otherwise, might be of no use.

If we carefully and attentively investigate the principles which rouse the various animals that surround us into action, we shall perceive that their utility is, in a great

measure, dependent on the consequences of that action.

The lives of all animals represent alternate action and repose. Action is compelled by hunger, or the wants of the body, and repose is the necessary consequence of satiety*. Both birds and beasts of prey are observed to be active and daring exactly in proportion to the degree of hunger experienced: and *lions* have been known to pass by other animals, their inferiors, without any molestation, when their hunger has been appeased: *eagles* and *hawks*, likewise, will often suffer the buffetings of very insignificant enemies when their appetites have been satisfied.

* BURTON had a very different notion of repose. He considered sleep as a distinct and separate mode of existence; and, on this subject, according to my notions, promulgated a great deal of unsound philosophy. "Sleep, in the animal," he observes, "therefore, is not an accidental state induced by the exercise of its functions while awake: it is, on the contrary, an essential mode of existence, and serves as a basis to the animal economy, &c. &c." But I must refer the reader to his *Dissertation on the Nature of Animals*.

It should seem, therefore, that INFINITE WISDOM hath set the destinies of all animals in motion by the principle of a craving appetite; and, by directing the wants of different animals to various kinds of food, according to the structure of their organization, nothing is lost, and the several parts of the whole creation are kept in due proportion and equilibrium: and thus is produced that wonderful variety in the manners and economy, as well as in the forms, of inferior creatures, which the most careless observer must daily witness. The investigation of this principle, and its operation, will lead to the discovery of the uses of most animals in the creation.

As I have already observed, in a former part of this little work, it cannot be doubted that carnivorous animals have been designed to act as positive checks on the increase of others, beyond certain limits; and their appetites have received their peculiar direction, accordingly, by *Him* who framed the universe; in order that the proportion and well-being of the whole might be duly

maintained. It has been remarked, that the germs of both animal and vegetable existence, on this globe, are innumerable; and that if, as MALTHUS hath well observed, "they could freely develop themselves, would fill millions of worlds in the course of a few thousand years. Necessity, that imperious, all-pervading law of Nature, restrains them within the prescribed bounds. The race of plants, and the race of animals, shrink under this great restrictive law; and man himself cannot, by any efforts of reason, escape from it."

The object of this abundance is sufficiently plain, since redundancy is the best security against want. If the populative, or productive, principle,—the procreative impulse,—were less strong than it is, there might be danger of extinction; and, on the other hand, if no checks had been established to restrict the numbers of animals within due limits, the most comprehensive imagination of man would be unable to form any adequate conception of the tremendous evils that would inevitably follow

the mighty redundancy which, in a very short time, would cover the earth like an irresistible and universal inundation. To live and to increase, seems to be the only object of irrational creatures, whether amongst men or brutes; and the consequences of indiscriminate, unchecked, libidinage, would be, and are, the same to both.

Nothing, then, can be more childish, or unphilosophical, than to call the tiger cruel, the eagle inexorable, or the crocodile merciless, attaching any peculiar malignity or injustice to those terms; since, in allaying their imperious appetites, such animals are but fulfilling, in their various capacities, the word of *Him* who commanded the one to roam the forests—another to haunt the inaccessible heights of craggy mountains—and a third to dwell amidst the solitary waters of a desert land—each to mitigate evils that would soon become fatal and universal without the use of such agency. In the sight of OMNIPOTENCE, and of unlimited benevolence, the lion is not less in-

nocent in the destruction of his prey, even though that prey should be the proud lord of the creation himself, than the bleating lamb whilst browsing on the tender grass allotted for its food : nor is the gaunt wolf, smeared with gore, and warm from the carnage, more guilty than the plaintive dove that picks up the scattered grain of the field. To the GOD of Nature the scream of the vulture, echoing from the awful solitudes of the Andes, is not more frightful than the melodious strains of the nightingale, rising in full chorus from the groves of Italy. Man alone is cruel ; he alone is oppressive and inexorable ; and he alone bears the tremendous responsibility.

CHAP. IX.

Further Observations on the Utility of Animals, illustrated by more familiar and obvious Instances. Of the Swallow, Common Earth-worms, Viper, and Toad. The smallest and weakest of Animals are of infinite Importance.

HAVING alluded to a few exotic animals, whose use in the creation is not so immediately, or clearly, manifest, for the express purpose of shewing that the utility even of the most noxious and destructive, or the most strange and unaccountable animals in appearance, may be discovered, by attentive investigation. I shall now adduce a few examples that may be deemed less equivocal.

Every one in this country knows that one of the earliest, most lively, interesting, and lovely harbingers of summer, is the *swallow*; insomuch, that it long ago became a pro-

verb amongst the rustics of England, that "*one swallow does not make a summer.*" It is, however, to be feared, that if a time does not come when *one swallow will* make a summer, a period may arrive when very few of this beautiful species will appear in this part of the European hemisphere; for it is very certain that the number of British *hirundines*, including all the species, have rapidly decreased of late years; and this decrease seems to proceed from several causes; one of which arises from a childish and very cruel practice that is but too general throughout Great Britain; the inhumanity, impolicy, and bad consequences of which cannot be more clearly shewn, or more effectually inveighed against, than by pointing out the vast utility of these interesting little summer visitants.

The proper and natural food of *swallows* consists almost entirely of gnats, flies, and small coleopterous insects; and some notion of the myriads of these insects destroyed by *swallows* alone, without mentioning the other *hirundines*, may be formed from a

most pleasing and interesting memoir furnished by the Rev. WALTER TREVELYAN, of *Long-Witton* in Northumberland*, to Mr. BEWICK; wherein it is mentioned, that a *tame* and a *young swallow* could eat from *seven hundred to one thousand flies* in a day. Now, if an immatured bird of this species, and in a confined state too, could destroy so many, we may be assured, that when at large, and having others to provide for as well as themselves, *swallows* must commit very wide and extensive devastation amongst winged insects. Supposing them to arrive in England about the middle of *April*, and to depart about the middle, or latter end, of *September*, making a stay of five whole months in this climate; and allowing that each swallow destroys from one to two thousand flies daily, the same bird must clear the region it inhabits of nearly 300,000 noxious, or troublesome, animals in one summer; and, before any conception of the myriads destroyed, in the course of a single

* See BEWICK's *British Birds*, vol. i. p. 263.

summer, by the whole race of *hirundines*, can be formed, not only must the exact number of *swallows*, *house martins*, *sand martins*, and *swifts*, which visit us, be known,—a matter that is impossible,—but our powers of calculation must be enlarged far beyond what they at present are.

Those who may be inclined to imagine that the mischief would not be very great if *swallows* were to become extinct, or were to cease visiting us, would do well to read ULLOA's account of certain districts in the *South Seas*, which have become desolate, and uninhabitable, through the infinite numbers of *mosquitoes*, and other species of gnats, which swarm there, and which never could have gained such an horrible ascendancy, if birds of prey, adapted for such food, were sufficiently numerous upon those coasts.

Although the climate of Britain is fortunately free from the inroads of *locusts* and the larger *mosquitoes*, yet it gives birth to innumerable swarms of gnats and flies, that would assuredly render even this blessed country uninhabitable by man, were the

checks upon their increase destroyed, or withheld; and of these checks, the *swallow* is one of the most active and powerful. "Whoever," as the eloquent and fascinating historian of *Selborne*, in Hampshire, has beautifully remarked,—“ whoever contemplates the myriads of insects that sport in the sun-beams of a summer evening in this country, will soon be convinced to what a degree our atmosphere would be choaked with them, was it not for the friendly interposition of the swallow tribe*”—a tribe that, to use the language of the same charming writer, “ are the most inoffensive, harmless, entertaining, social, and *useful* of birds: they touch no fruit in our gardens; delight, all except one species, in attaching themselves to our houses; amuse us with their migrations, songs, and marvellous agility; and clear our outlets from the annoyances of gnats and other troublesome insects.”

* WHITE'S *Natural History of Selborne*, vol. i. p. 263, 2d edit.

After being made sensible of the value and importance, as well as the beauty and amusing interest, of these birds, it is a subject of indignation and sorrow to behold a cruel miscreant, or an idle blockhead, wantonly destroying them, under some miserable pretext or other. The common excuse made, is, that he who can kill *swallows* upon the wing with ease and dexterity, is likely to become what is termed a *good shot*, and that the *amusement* is practised with such a view. Whether this be true or not, such a motive can be no excuse for a cruel, an unjust, and a wicked act, like that of murdering innocent and highly useful creatures through mere wantonness. Few sights can be more repugnant and disgusting to the feelings of a benevolent man, whatever may be his claims to the character of a *Naturalist*, than a lazy clown, under pretence of qualifying himself to become a *game-keeper*; or a weak, corrupted, or effeminate *citizen*, who may never be qualified to pursue nobler game; employed in such a detestable practice, which ought to cease for ever amongst

a people pretending to a noble, a generous, a benevolent, an enlightened, and a manly character.

I was very much gratified a few years ago by observing the following paper, alluding to this subject, in the *Maidstone Journal* of June the 18th, 1793: a paper that was dictated by the most honourable and enlightened motives*.

“ At a meeting of the *Kentish Society*, on Thursday last, the following very valuable observations were communicated by Mr. HUNT, gardener, of this town.

“ A great custom has of late years prevailed in these parts, among gentlemen, sportsmen, and game-keepers, of destroying the different species of martins, or swallows, which entirely live upon the wing, and are only seen in this country during the summer months. Mr. HUNT remarked, that the number of these birds has, within these few years, greatly diminished; and that the present year produces infinitely less than

* It was republished in the *Gentleman's Magazine*.

can be remembered in any preceding one. This diminution is attributed, in a great measure, to the wanton havoc which is made of them by *practitioners*, and others; with their guns, who, without reflexion, destroy what Providence hath sent for a great purpose. By shooting the old birds, the nestlings are, in consequence, destroyed; which, when added to the numbers lost in the sea, during migration for the winter, unitedly assign a true reason for their great decrease. Minute observers calculate, that one of these birds daily destroys several hundreds of moths, flies, and other insects, which are the parents of those alarming swarms of caterpillars, grubs, &c. that have lately committed such serious disasters in our orchards, gardens, and fields. It is earnestly hoped that the gentlemen who are alluded to will discontinue shooting or destroying any swallow, martin, swift, or other bird that feeds on the wing. Their humanity and forbearance towards this valuable and inoffensive part of the feathered creation, will serve to reduce the number of those

noxious insects which annually infest the British Islands."

This judicious paper was published by way of *advertisement*, or general caution, and, I believe, excited considerable attention. But the practice of shooting *swallows* and *martins* still continues in most parts of the Island, and is therefore still deserving the most severe reprehension. The idle and dissolute persons who indulge in it ought to be made to feel, if they cannot be taught, that the engaging *hirundine*, which, in all its airy gambols, daily and unceasingly fulfils the duties appointed for the business of its harmless, busy, life, is of more use in the creation, and, perhaps, more pleasing in the sight of the UNIVERSAL FATHER, than the wretched mortal, with all his pride and vain glory, who is continually abusing his free-agency, and thereby creating that evil in the world of which the minor animals can never be guilty.

Though one good example is sufficient to illustrate the truth of the assertions I have made respecting the value of the knowledge

that may be gained from studying the *utility* of animals, I shall venture to add a few more hints, by way of illustrations; both in order to prove the interest and importance of such inquiries still further, and to excite a spirit of investigation into the lives, economy, and use, of some inferior creatures with which the Naturalists of this country are, generally, but little acquainted.

Common *earth-worms* appear to the ignorant like senseless, brittle, unmeaning, moveable tubes filled with earth, of no apparent utility in the creation, except it be to feed a duck or a fowl; and of so simple and unfeeling an organization, that there can neither be cruelty nor injustice in tearing them into writhing, bleeding, fragments, or crushing them into mucilage under foot. But ignorance is the source of every evil, and the cause of all injustice. Though *worms* have not the five senses of man, they are most acutely and perceptively sensitive: though they have not the comprehensive intelligence of some other animals, they have sufficient intellect to en-

able them to fulfil duties of the first importance; and though superficial observers may consider their external forms as disgusting, and their existence of no material consequence to the grand scheme of creation; they are of so much general utility, that not only would several whole genera of birds perish, but vast districts of land, that by their means are now fertile, would become hard-bound, barren, and unprofitable, if this race of animals should become lost, and extinct.

Comparatively, very little is yet known of this curious family of *vermes*, notwithstanding the pleasing hints thrown out by the intelligent WHITE* so long ago as the year 1777, when he observed, that "a good monography of worms would afford much entertainment and information at the same time, and would open a large and new field in Natural History." This elegant writer, indeed, seemed to have entertained just notions of the importance of these poor

* *History of Selborne*, vol. i. p. 364.

despised animals; for he has well observed, that "Earth-worms, though in appearance a small and despicable link in the chain of Nature, yet, if lost, would make a lamentable chasm. For, to say nothing of half the birds, and some quadrupeds, which are almost entirely supported by them, worms seem to be great promoters of vegetation, which would proceed but lamely without them, by boring, perforating, and loosening the soil, and rendering it pervious to rains and the fibres of plants, by drawing straws and stalks of leaves and twigs into it; and, most of all, by throwing up such infinite numbers of lumps of earth called worm-casts, which, being their excrement, is a fine manure for grain and grass."

The utility of worms, indeed, really consists in fertilizing the earth, though they act also as correctors to our rich soils; a fact that seems to have escaped the notice of the accurate WHITE. By cleansing the surface of the ground they inhabit of those vast quantities of leaves, fibres of plants, and decaying vegetable matter, which, at

certain seasons, cover the earth, they make the best possible preparation for reproduction. Poor soils are ameliorated and enriched by their labours, and rank land is rendered more serviceable by having a portion of the fat redundance of vegetable particles removed, which is performed by *earth-worms*, who prey upon the finer parts of rich vegetable mould, as well as upon vegetables themselves: a fact that may easily be proved, by dissecting one of these animals newly taken from fertile ground.

Worms have another important service to perform, which is done by producing a gradual and regular change and admixture of the component parts of the soils they inhabit, which are generally fertile in proportion to the number of *worms* found in them: insomuch, that no animal of this kind was ever found in a strictly barren piece of land. Both farmers and gardeners form very erroneous conclusions on this subject; and are never more blinded by prejudice, than in their persecutions of these useful agents, who convert what would

otherwise be unprofitable, into the best materials for a fertile soil ; and, as they only draw into their holes what is prostrate upon, or touching, the earth, they cannot injure the strong and healthy plants which grow upright. But I did not intend to enter upon a general and particular account of these curious animals on this occasion. I merely wished to point out their utility ; and I have probably written enough for that purpose.

Amongst those unfortunate creatures against which the persecutions of foolish and unjust men have gone forth, there are none which have suffered more in this country than the *viper*, and the *toad*, who are both the agents of good, rather than the ministers of evil. Ere long it will haply be in my power to shew with what degree of success I have studied the lives and character of these interesting reptiles, which have laboured under the most cruel and unfounded misrepresentations. At present it is sufficient briefly to point out in what their utility, in the creation, consists.

These animals are both *checks* on the superabundant increase of others upon whom they are destined to prey, though their modes of action are very different.

The *viper* subsists principally on mice of different kinds, all of whom are exceedingly prolific; and, were it not for such an enemy, they would soon overrun and devastate the whole country. But, not being able to secure its prey by the force of its mere bodily powers, the *viper* is furnished with an instrument of destruction so ready, and certain, that *touching* the object of its pursuit is sufficient to secure it, to be devoured with that leisure so necessary for an animal which has to swallow another whose bulk is so large in proportion to itself. It cannot be doubted that I allude to the poisonous fangs with which the jaws of the *viper* are furnished.

Being destined to devour living prey, the *viper* will not touch a dead mouse, unless compelled by the most ravenous hunger. It generally darts upon its victim by surprise; for which its rapid, silent, gliding

motion, close to the surface of the earth, or amongst the foliage of a bush or thicket, is admirably adapted. Having inflicted the wound, and rendered it inevitably fatal by instilling a few drops from the poisonous receptacle at the base of the fang on each side the upper jaw, it fixes a steady and deadly gaze upon the wretched victim, till it perceives that it is wholly incapable of any vigorous resistance ; an effect that very speedily takes place after the wound is given ; when it boldly advances, and begins to swallow the prey whilst it is still warm, and often before the heart has throbb'd its last beat. The number of *shrews* and *field-mice* destroyed by one *viper* in the course of the summer months, is very considerable, and the consequent benefit very great.

The services of *snakes* are so important, and so necessary to the general business of the creation, that we find them exceedingly numerous, especially in warm countries. There are several hundred species already known, and it is probable that nearly as many remain undiscovered.

If the study of *Natural History* was cultivated and pursued with the views this little Essay is intended to promote, many questions, now considered difficult, would be of easy solution. Some short time ago it was put to a certain learned society, to declare *why some species of serpents were furnished with poisonous fangs, whilst others had no instruments of destruction of that kind, and were consequently harmless!* After much discussion, this simple question was deemed unanswerable: at least, such answers were given as plainly demonstrated that the true cause was not perceived.

There can be little doubt, however, that the real cause of this difference in the *serpent* tribe is to be found in the different destinies of the animals. Those which are designed from the beginning to prey upon animals capable of powerful resistance, are furnished with the means of rendering that resistance very speedily of no avail; and it is quite certain, that if poisonous serpents were deprived of their fangs, their race would soon become extinct. On the other

hand, we find that such *snakes* as feed on insects, grubs, snails, small reptiles, and the like, being fully able to secure their feeble prey by the force of their own bodily powers alone, have no deadly poison, assassin-like, to instil; because there is no occasion for it. For illustrations of these truths we have no occasion to travel out of our own country, since the common *viper coluber berus*, and the common, or ringed, snake, *coluber natrix*, afford, in their manners and economy, the most striking examples.

The utility of the *toad*, likewise, consists in acting as a check upon the redundant increase of minor animals; performing those services upon, or near, the surface of the ground, which insectivorous birds, that prey upon the wing, perform in the air. There is no animal found in Great Britain whose natural history is more extraordinary, and interesting, than that of the *toad*: but, at present, I can only hint at the manner in which it becomes most eminently useful in the general business of creation.

The object of its existence is to destroy *living* insects and worms of almost every genera and species, that are not too large, which cross its humble path through life. And the manner in which it surprises and secures its prey is peculiar to itself. Having a keen and watchful eye, and a steady, piercing, sight, but with very little activity, it generally steals upon its victim with such slow caution, and with so curious a gait, that the spectator is often reminded of the manner of a spaniel, or pointer, when he has first scented any game, and is endeavouring to get as near to it as possible—now crouching close to the earth, now elevating and advancing the head, now slowly moving one leg, and then another, till it has approached within a few inches of its prey; when its fine and expressive eye seems suddenly to lighten up, and dart forth glances of unusual keenness, and the victim is seized, and swallowed, with a motion so quick, that the eye of a spectator can scarcely follow it. The tongue of the animal is the instrument which is used upon

this occasion, and it has many striking peculiarities, being wonderfully well adapted to accomplish the purposes for which it was intended. It is very long, slender, and singularly elastic; and is covered, particularly at the end, with a kind of glutinous saliva, to which the insect struck at closely adheres, and is thereby more readily and easily secured. But the most extraordinary character in the formation of this part of the animal, is the situation of the tongue, and the manner in which it is fixed, and operates, in the mouth.

The basis of the tongue of a common *toad* is fixed just within the extreme tip of the lower jaw, and that organ lies backward with the point towards the throat, when at rest, in a manner quite different from what I have observed in any other animal, but for a purpose that is very apparent; for, by this folding back of the tongue, the elasticity and quickness of its motion, and the glutinous matter at its pointed tip, an insect is seized and jerked into the throat in a wonderfully rapid and imperceptible man-

ner; and it is reasonable to conclude, that without this peculiar formation, and the celerity of movement of which the part is capable, all winged, or quickly moving insects, would escape the stroke.

As the *toad* frequently preys upon *bees* and *wasps*, whose stings are to be dreaded, the upper and lower jaw of this reptile are furnished with two protuberances, between which the *bee*, or *wasp*, that has had the misfortune to be seized, is almost instantaneously squeezed to death, in order to prevent any dangerous consequences, from the sting, in the act of deglutition.

Nothing can be a stronger evidence of the part which the *toad* has to act in the creation, in respect to its prey, than that it uniformly refuses to eat a dead insect. A relative, and intimate friend of mine*, has tried the experiment, at many and various times, for the last twenty years, but could never succeed in inducing one of these ani-

* WM. FOTHERGILL, Esq. of Carr-End, in Wensleydale, Yorkshire, who has generally a tame toad in his garden.

mals to strike any thing that had not sufficient life to enable it to move. In order to try whether it was possible for hunger to conquer this aversion, he placed a vigorous *toad* in a large garden pot; and having counted into it a certain number of *bees*, newly killed, covered the top in such a manner as to admit some little air and light, but totally to exclude such insects as were likely for the *toad* to feed upon. At the expiration of six or seven days, he found that not a single *bee* had been touched, notwithstanding he was well aware that this insect, when alive, constitutes a very favourite species of food.

The havoc made by *toads* amongst the tribes of insects which constitute their food, is very great; of which any one, who will take the trouble to place a tame and hungry animal of this species under a bee-hive, may be speedily convinced*.

* The author cannot avoid making use of this opportunity to observe, that he hopes it will soon be in his power to lay a very full and complete account of this curious and interesting reptile before the public; and to rescue a poor despised

The few illustrations, or rather hints at illustrations, which I have now given, may be sufficient to shew the young student in *Natural History* what interesting truths and discoveries he may hope to gain by cultivating this delightful science with true philosophical and comprehensive views:—views that have been but seldom taken by professed *Zoologists*, who, in general, seem not to know that they have performed but a very small part of their duty when they have described the mere external forms and characters of animals, the smallest and weakest of which have great and important services to perform during their little span of existence; and, as such, whatever scoffers may say, are worthy of our most serious attention.

“ Let no presuming impious railer tax
CREATIVE WISDOM, as if aught was form'd
In vain, or not for admirable ends.

animal, whose natural history has been by no means well understood, from persecution the most unjust, and from opprobrium the most unmerited.

Shall little haughty ignorance pronounce
His works unwise, of which the smallest part
Exceeds the narrow vision of her mind ?
As if, upon a full-proportioned dome,
On swelling columns heav'd, the pride of art !
A critic-fly, whose feeble ray scarce spreads
An inch around, with blind presumption bold
Should dare to tax the structure of the whole.
And lives the man, whose universal eye
Has swept at once th' unbounded scheme of things ;
Mark'd their dependence so, and firm accord,
As with unfaltering accent to conclude
That this availeth nought ? Has any seen
The mighty chain of beings, lessening down
From INFINITE PERFECTION to the brink
Of dreary Nothing, desolate abyss !
From which astonish'd thought, recoiling, turns ?
Till then alone let zealous praise ascend,
And hymns of holy wonder, to that POWER,
Whose wisdom shines as lovely on our minds,
As on our smiling eyes his servant-sun."



CHAP. X.

A few Remarks on the Abstract Principle of Pleasure and Pain, as it affects, or governs, some Part of the Animal World.

BESIDES the principle of hunger and satiety; of waste and of want; to which I have alluded as the occasion of activity and repose in animal life; there is another governing principle equally strong and general, which also serves to prove the grand simplicity of those laws which direct, or restrict, the locomotive parts of creation, in the course of their destiny. I mean the principle of *pleasure* and *pain*.

By a wise dispensation of PROVIDENCE it is eternally decreed, that the greatest pleasure which all animals experience shall arise from the exact fulfilment of their duties, or destinies, whatever they may be, and whether they are acquainted with the

final object, or not; and, contrariwise, that their greatest pain shall proceed from any dereliction from the line of those duties, whether voluntary or compulsatory: so that, as sensitive beings naturally pursue and cleave to what gives them pleasure; or, in other words, that is agreeable to their sensations; and avoid what is hurtful or painful to them, from the same cause; the great business of the animal world is carried on with unerring steadiness and alacrity.

This principle is daily illustrated by a thousand acts that occur before our eyes; but in none does it appear so beautiful, and so important, as when displayed in those ties of affection which unite the interests of several animals in one bond of union; though the kind, genial, and mysterious influences, which draw those ties together, sometimes proceed from very different causes, even in animals of the same species, as may be proved by the conduct of old to young, and young to old. The love of an old animal, for example, must be considered

in a great measure disinterested, because it can not only exist wholly independent of its offspring, but is not absolutely compelled to assist it in life, further than by the pleasurable emotions arising from that assistance: but it is very different in the case of the young animal, whose regard for its parent is eminently selfish; it clings to its mother, because experience soon teaches that it is impossible for it to support existence without her. From parental aid, in the morning of life, all nourishment is derived; and it is in the *descent of love*, and the exquisite pleasures arising from it, that we must look for the springs of present and eternal continuance.

Thus may the nature of DIVINE LOVE find illustration even amidst animals of the lowest and most inconsiderable rank. How beautiful are the lessons,—how endearing the practice, of UNIVERSAL BENEVOLENCE! Love does indeed descend! She is of celestial birth: but her emanations, like the sun's meridian beam, when reflected back to its

parent skies, lose on earth much of their original brightness.

Man, himself, is not more capable of expressing the emotions of joy or of sorrow, by silent gesture, at least, which is sometimes the most powerful of all eloquence, in a more striking or affecting manner, than many of the inferior animals, and especially the feathered warblers of our fields and woods. In my youth, like most other boys, I was an ardent *bird's-nester*, but was soon weaned from that cruel practice by finding my heart powerfully and irresistibly touched by the sorrows of the poor, plundered, hapless birds; whose griefs were expressed in a thousand little gestures, and inward wailings singularly plaintive, though scarcely audible, which could not but prove deeply affecting.

On the discovery of their loss, a chilling horror seems to creep through all the veins, and drive back the ruddy current of their blood to the citadel of life itself; and, remaining for a while fixed in one motionless

attitude of grief, with a kind of wild and vacant stare, they gaze on the few wretched remains of that comfortable little dwelling which so lately held all to them most dear, and which with so much studious care they had placed in the lowliest covert, near their favourite haunts, fondly hoping that its solitude would prove a sanctuary :—then, as if suddenly awoke from a frightful dream, with piercing cries they hurry from the fatal spot, and fly to the thicket's deepest shade ; where, with ruffled plumage, and heavy heart, their swimming eyes half closed, they sit for hours wholly regardless either of the passers by, or of the songs of their more happy associates.

It is far from my desire to make any useless or improper digression ; but I cannot help observing, that it is rather surprising our incomparable SHAKSPEARE, who was himself so highly-favoured,—so genuine,—so sweet a child of Nature, should have made no more of *Macduff's* grief for the loss of his children, since he seeks at all

for a striking simile amongst the feathered race. It is a fine touch, however, where *Malcolm* says,

“ What, man! ne’er pull your hat upon your brows!
Give sorrow words! the grief that does not speak,
Whispers the o’er-fraught heart, and bids it break.”

MACBETH, act iv. scene 3.

More of the externals of deep sorrow might, perhaps, be learnt from the visible emotions and attitudes of some birds, on a deprivation of this kind, than from any other spectacle. But the immortal dramatist, our favourite bard, may have intended *the action*, in this instance, to receive and impart its principal force from the genius of the actor: if so, the managers of modern theatres defeat the intention completely, in respect to *Macduff*, by assigning this character to second-rate or inferior performers, thereby depriving of its due effect a very fine passage in the English drama.

Whilst on this subject, I cannot avoid making another remark that may appear

equally digressive, though it is remotely connected with it. I have no inclination, on the present occasion, to discuss the question, Whether beauty can exist independent of utility, or not? but I think it is pretty clear, that the beauty which depends upon a false basis for its existence, can have little power to charm; and ought to be, as it generally is, of short continuance; since truth alone is really beautiful and eternal. On this ground it is remarkable that poets, even from the earliest periods, should have delighted in representing the feathered race as miserable in their songs; as if other similies of woe, more true to nature, could not have been found. According to them, the music which floats on every gale of summer, filling the whole concave of heaven with delightful harmony, is the voice of sorrow, rather than the spontaneous flow of universal joy, rendering praise to the Most HIGH. But how different does the *inspired* bard, Jesse's mighty son, represent the songs of creation! From his pen they appear as the incense of thanksgiving and

adoration ascending from grateful multitudes to the throne of GOD. Still, however, that man would be deemed a miserable cynic indeed, who could be angry with MILTON for introducing the nightingale as an emblem of his "*Il Penseroso*," when it was in his power thus to tune his heavenly lyre:—

" 'Less Philomel will deign a song,
In her sweetest, *saddest* plight,
Smoothing the rugged brow of night,
While Cynthia checks her dragon yoke
Gently o'er th' accustom'd oak :
Sweet bird, that shunn'st the noise of folly,
Most musical, *most melancholy* !
Thee, chantress ! oft the woods among
I woo, to hear thy even-song :"

and still less, perhaps, ought we to object to Coila's favoured bard for singing of his *wood lark* in strains so "*impassion'd, fond, and free.*"

" O stay ! sweet warbling wood-lark stay,
Nor quit for me the trembling spray !
A hapless lover courts thy lay,
Thy soothing, fond complaining.

Again, again that tender part,
That I may catch thy melting art;
For surely that wad touch her heart,
Wha kills me with disdainin'.

Say, was thy little mate unkind,
And heard thee as the careless wind?
Oh, nocht but love and sorrow join'd,
Sic notes a' woe could wauken.

Thou tells o' never ending care;
O' speechless grief, and dark despair;
For pity's sake, sweet bird, nae mair!
Or my poor heart is broken *."

A little false philosophy may be pardoned in poets such as these: but in the numerous class of petty rhymesters with which the literature of this country is burthened, who have not skill to clothe their wretched ditties in the mantle of true poesy, this bad taste is insufferable, and in any will be felt by the *philosopher* as a blemish.

But let us not wander too far from our subject.

* CURRIE'S *Burns*, 4th ed. vol. iv. p. 226.

By making the performance of indispensable duties delightful, and by proportioning the sense, or degree, of pleasure to the importance of the act; the SUPREME BEING seems to consummate *His* designs, and to govern the world, by means that strikingly display the beneficence of *His* nature; since, through *His* omnipotence, every thing might have been accomplished by compulsory and arbitrary laws.

This principle is beautifully illustrated in what, at first sight, appears the least pleasurable path of duty—in the nidification of birds; though upon it depends the continuance of the species; and, when attentively considered, it affords a fine exemplification, not only of the *wisdom* of God in the creation, but of *His* goodness, mercy, power, and unbounded beneficence. I allude to the feeling, or sentiment, which animates and gives joy to the breast of a bird during, what appears to us, the irksome and arduous task of incubating her eggs.

To the eye of a careless observer, the spectacle of a little bird cowering close to

the earth, in some solitary spot, under the waving canopy of a broad leaf, or tuft of grass;—remote from communion with her old associates;—neglectful of all those little niceties and personal attentions, of trimming and smoothening her speckled plumage, which, heretofore, she had been wont to perform with so much care;—banished from her favourite haunts by the brook, the spray, or the grove;—no longer able to enjoy her morning excursions, through the clear azure of heaven, to hail the rising orb of day;—forgetting almost to gather the necessary supply of food;—sitting for days, and nights, and weeks together, on a little bed of weeds, careless whether it be light or dark, hot or cold, wet or dry, and wholly regardless of every thing which, but a short time before, had yielded her delight:—to such an observer, a spectacle like this might appear not only extraordinary, but even unaccountably stupid; and he would at least consider it as an instance of singular and distressing patience. But the true Philosopher of Nature knows the real state of the

case to be far from being either painful, or an exciting cause of pity:—he knows that the most dear, sweet, tender, important, and interesting of all sentiments, is at that time pervading the whole, palpitating, bosom of the little anxious bird, and imparting to it a joy the most thrilling and unutterable.

It is in marking the birth and progress of this secret, mysterious impulse, that we are able to perceive its force and utility. If the duty of incubation had not been accompanied, as it is, by sensations of the highest pleasure, we may readily imagine that, from the trouble and privations to be supported during its continuance, there would have been great danger of its not being performed at all; and, consequently, a risk of extinction to that race of animals. But, by a wise dispensation of PROVIDENCE, the exquisite feelings of joy by which this service is accompanied, are made to increase exactly in proportion to the necessity there exists for the attentions of the parent. Thus, in the early stages of incubation, this plea-

surable sensation, to which I am alluding, is felt only in a small degree; but, with the deposit of each succeeding egg, it increases in fervour, till, at length, when the whole number are laid, it has reached such a height, and constancy, that the bird finds it can no longer endure an absence from them; she therefore covers and presses them close to her bosom; and as, by the genial warmth of her body, the embryo gradually matures, her attention and assiduity become more and more fixed, and her whole existence seems absorbed in that critical moment when the shell cracks—opens—and the trembling, stackering, naked youngling tumbles into active life!

Hitherto the pleasures of the parent seem to have consisted in a total abstraction of all her faculties from external objects in delightful reveries of fancy, or in dreams of the future; she seems to have been looking forward with pleasing, patient, hope, for the period when her little ones should break from their imprisonment, and become tenants of the air. Converting, by these

means, what would otherwise be a painful task, into the most delightful employment of her existence.

Now, when she finds the reward of her assiduity,—when she feels her new-born progeny crowding to her downy breast,—she is all life and spirit. From the earliest dawn to the fall of twilight she is constantly on the wing, seeking far and near for the food appointed by the destiny of her species. She is never weary, never negligent;—the cries of her callow brood are continually sounding in her ear;—she feels that they require her constant care, and she gives it. But, in the midst of all this interesting bustle, it is curious and instructive to observe, that, from the moment in which the young are emancipated from the egg-shells, the period when attention is the most necessary, the fervour and constancy of affection in the parent gradually abates, as the young become feathered and acquire strength. The period of hatching is the grand climax; before that time it has been progressively increasing; afterwards, it as

gradually and imperceptibly declines, exactly in the ratio of the necessity; till it is no longer required, when it ceases altogether, and the offspring are left to shift for themselves. So wise, so regular, so unerring are the laws which govern this beautiful creation.

In some remote countries, where, haply, the poor birds are so distant from their grand enemy, man, as to be but little acquainted with his power, or malignity; instances occur of their occasionally suffering him to approach their nests, without exhibiting any marks of fear, or moving off, and even to lift them from their eggs with his hands. Even in our own remotest islands of the north I have sometimes met with birds in this situation, so unacquainted with the form and character of man, as to allow me to remove them from their nests in my hands. I have done this several times with the common red grouse, *tetrao scoticus*, red-breasted merganser, *mergus serrator*, and the eider-duck, *anas mollissima*.

On such occasions the hapless birds ap-

peared as if suddenly awoke from a trance ; —they seemed utterly astonished, and were, for a considerable time, wholly incapable of exertion, or of making any attempt to escape ; and, when set down upon the ground, at some little distance from the nest, instead of flying off in terror, as might have been expected, they instantly rushed back to their darling treasure, and cowered down upon their eggs with increased closeness and assiduity.

A circumstance witnessed by a friend of mine, in the vicinity of Edinburgh, may illustrate this matter still further. A sailor boy, belonging to a certain vessel that lay at anchor in Leith Roads, happened to find a nest of the eider-duck, *anas mollissima*, in a small island of the *Frith of Forth*, which he robbed. As he was walking off with the eggs, his surprise was excited by observing the disconsolate mother waddling after him as fast as she was able. In order to amuse himself, and try the force of the bird's affection, the little urchin placed the eggs promiscuously on the ground ; and, though

close to his feet, they were immediately covered by the unhappy bird. He next carried them into the small boat that was to convey him to his ship, and the poor bird still pursued her treasure. At length they reached the vessel, and the *duck* was actually decoyed on board, quite unmindful of the noisy sailors by whom she was surrounded; who, however, so far pitied her case, as to permit her to sit upon her darling eggs, for a while, in peace; but, unfortunately, she was discovered by a little rascal on board, who tied a cord to one of her legs, and amused himself by swimming her round the ship till she was drowned!

CHAP. XI.

On the Change of Matter that is continually taking place throughout the Animal, Vegetable, and Mineral Kingdoms.

IN the course of this little work I have several times made allusion to the change which every one must observe to take place, at some time or another, in all visible bodies, in or upon this earth, whatever their organization may be. With respect to this globe, it is evident that nothing is fixed, or stationary, and that nothing is lost; and that, whatever may have been the grand design of OMNIPOTENCE in forming that beautiful creation which covers its surface; it is certain, that the peculiar properties of all its parts tend to the good of the whole. To find in what manner the propensities of the locomotive, or the qualities of the more stationary, parts contribute towards that

good, is an employment worthy of deep attention, and a subject from which the *Naturalist*, in particular, may expect to derive abundant light and instruction.

The subject, however, is difficult; and I make few or no pretensions to the *physiological* character, as it is understood in these times. It requires long and patient investigation to ascertain the exact manner in which matter, under any animal or vegetable form, is changed, and the immediate cause or object of that change, with precision and truth. Yet the subject is of the deepest interest, and of the highest importance. If, therefore, a single hint, by which new discoveries can be made, is thrown out in this chapter, I shall be well rewarded for the boldness with which I have ventured into the dark and intricate mazes of this difficult branch of *Natural Philosophy*.

Whether the soul of man, after death, lies nearly evanescent in a minute particle of earth, the wreck and residuum of his corporeal frame, till a certain period ap-

pointed from on high; or, it flies off with the latest breath to mingle in atmospheric air, or with other spiritual existences in the region of light and eternal life, is a question that has never yet been settled, either by religion or philosophy; nor is it likely to be determined by any mortal till the shackles of his present existence are knocked off: but, from the evidence of our senses, we are quite certain that the matter of which *all visible* and *tangible* bodies are formed, though continually changing, remains in, or upon, or about, this massy globe; from which nothing departs; and to which nothing comes, except light and heat.

It has been remarked, “That all animal and vegetable substances are ultimately the same, may be strongly inferred, by observing, that, by putrefaction, they are both resolved into one uniform, undistinguished mass, the properties of which are exactly the same, be the subjects ever so different; so that the matter is originally the same,

only modified into different forms *.” This observation is well founded; though it is evident that the finest particles of matter are required for the composition of the more sensitive and delicately organized bodies used as vehicles for animal life; and that vegetables, occupying the next degree of rank lower, are composed of finer materials than mineral substances. So far there must always be some little difference in the materiality of natural bodies; a difference that is even perceptible in their remains after decomposition.

Whatever is the nature of the original, simple, earthy, material, out of which the ALMIGHTY GOD hath formed every tangible body in this creation, it seems to have been *His* design, that, throughout all the revolutions of the matter employed, in all those curious and often inexplicable changes which may daily and hourly be observed to

* See Supplement of *Gentleman's Magazine* for 1771—On the Distillation of Spirituous Liquors from Milk.

take place, there should be no such thing as a positive *caput mortuum*. It would, indeed, be inconsistent with *His* divine wisdom to permit any thing of *His* creation to remain without utility : hence we may safely conclude, that there is nothing in existence which is wholly independent of some other thing.

A very material difference, however, may be observed between the changes of animal and vegetable matter, and that which composes mineral substances. The former, both in growth and decay, from its adaptation to ten thousand different forms, seems continually liable to be incorporated, and finally is incorporated, with other substances ; thereby soon losing the temporary identity it may, at any time, have obtained. But, whatever artificial process mineral substances undergo, they have a continual tendency to return to their original state, probably because they are destined, as the grosser part, to form the basis or grand support of the general fabric of this creation. I am not certain that I express myself

so as to be clearly understood ; but a few illustrations will explain the nature of these positions.

So speedily does the matter used in the composition of animals lose its identity, and its particles become scattered abroad, and used again for other purposes, that an animal (in a state of nature) is no sooner incapable of performing its ordinary functions with health and with vigour, than it becomes the immediate prey of innumerable enemies, which seem to rise up like magic from all sides, however remote and solitary may be the situation in which the wretched creature has fallen. Should a poor ragged sheep, for instance, decrepid with age, and worn out with disease, yield its last gasp in the midst of a wide and dreary waste, so barren and inhospitable, that, before such an event, the solitary wanderer might have sought in vain for any living creature ; the carcase would immediately be scented afar off, and beasts and birds, and reptiles and insects, of various forms and character, but all with a thirst for blood, would find their

way to the spot; and, in a few hours, no vestiges of the carrion would remain. But instances of a more extraordinary nature sometimes occur.

During my abode in the neighbourhood of York, a few years ago (1808), a certain tench, *cyprinus tinca*, which had been taken in the river *Ouse*, was put into a stone trough full of water, that stood in a pasture-field, for the use of horses and cattle which fed there. This trough, which was of large dimensions, was supplied by a fine spring of water that continually ran into it; and it was, therefore, supposed that the fish would be able to subsist in it for some months, at least; particularly as it was well supplied with numerous aquatic insects.

But, as the poor *tench* had been carried several miles, and had long been deprived of the solace of its natural and beloved element, it was very weak when cast into this receptacle. Notwithstanding its debility, however, it seemed pretty certain that it would very soon have recovered its wonted health and strength, had it not

been for a very fatal and unexpected accident.

A number of common *horse-leeches*, *hirudo sanguisuga*, had occupied the watery retirement of this well for a great length of time, and had been suffered to increase to a considerable multitude. When the unfortunate *tench* was placed in the trough, the *leeches*, which might have regarded this abode as their own peculiar inheritance, became restless and inquisitive, and swam round the intruder several times, though at a respectful distance, as if in the act of reconnoitring.—By the bye, it would be a subject of curious research to ascertain with exactness what are the organs of perception in a *leech*.—At length having approached nearer without discovering any signs of hostility, or even of the vigour necessary for any adequate defence, in the fish; a small party of old *leeches* commenced the attack by fastening, at the same moment, on different parts of the helpless animal. This example was soon followed by all the *leeches* in the place; and, in a little time, no

less a number than *twenty-three* had fixed upon it; some on the belly, and at the insertions of the fins; whilst others attacked the head, the eyes, and gills, or wherever they could lay hold. The spectacle was disgustingly painful. In a short time the poor fish expired under the most acute suffering; and, in a few days, was utterly destroyed, without the agency of any other means. The most remarkable circumstance in this distressing, though highly curious and instructive scene, is, that the *leeches* should have power to penetrate the hard, close, and thickly set scales of the *tench*, which they seemed to do with the greatest ease, for it was very speedily covered with blood and death.

It is not, however, necessary to appeal to many remarkable instances of the above nature for illustration of the various modes by which animal matter becomes changed, and dispersed, when a familiar example may be sufficient to set the mind of the reader at work, and to excite those trains of thought which every individual must cultivate and

pursue for himself, if he has any desire to derive benefit from them. An example of this kind may be found in the services performed by the common *flesh-fly*, whose chief business in the creation seems to be the destruction of carrion, and to lay its eggs in dead or putrid flesh, which, on hatching, become maggots to consume that flesh; and, when that is done, they, in their turn, become flies like their progenitors, lay eggs for a similar purpose, and die. The general usefulness of such an operation is obvious, and strikingly illustrative of the strange metamorphosis, the very matter of which we, ourselves, are formed, may undergo; changes which shew, as the immortal bard of Avon hath strongly expressed it, that even "*a King may go a progress through the guts of a beggar* *;" and that the noble dust of ALEXANDER, or of imperial CÆSAR, might, without any extraordinary stretch of the imagination, be traced to the stopping of a bung-hole †.

* *Hamlet*, act iv. scene 3.

† Act v. scene 1.

The manner in which vegetable matter is changed and incorporated with other bodies, is of more easy apprehension, because more constantly before our notice. Even the most inattentive observer cannot avoid daily witnessing its consumption by a great variety of animals, as well as its decomposition and mixture with the earth on which it has been supported. It has one peculiarity, however, that is by no means generally known; and in which it very materially and remarkably differs from animal matter. When an animal dies, its body is annihilated; so far as this, at least, that no art, or effort of nature, can organize another animal, exactly similar, out of the *same* materials; for there is no principle of reproduction in the matter of which it is composed.

But when a plant, a shrub, or tree, has perished, the materials of which it was formed retain a principle of regeneration and life that is continually making efforts to rise again, and resume the form it has lost.

Perhaps I cannot better explain this

truth, than by relating an authentic instance of the kind of vegetable regeneration I mean, which was sent to the Royal Society of England by G. CRAMER, *Prof. Math. Genev.* It is as follows:—

“ A friend of mine having caused some ashen pipes, that brought water to his fountain during at least twelve years, to be taken out of the earth; they were left in a yard not paved, where they rotted almost entirely: but in their room there did shoot forth from the earth a little forest of ash-trees. They are now in a flourishing way, and about three or four foot high. It is remarkable, that more than fifty young trees are sprung up exactly where the pipes had been laid, and no where else in the yard. There is no ash-tree there about, nor, perhaps, at a very great distance, the yard being in the town*.”

In respect to minerals, I have already remarked, that whatever process they un-

* *Philosophical Transactions*, abridged by EAMES and MARTYN, vol. vi. part 2. p. 380.

dergo, they have a continual tendency to return to their original state; and, to shew what I mean, one example may be sufficient. Of these earthy substances, one of the most serviceable to man, and consequently one of the best known, is lime, which, in its natural state, is little better than a positive *caput mortuum*, and of no use either as a manure, or for the purposes of building, until it has passed through the kiln; but, after it has been calcined, and the fixed air, or carbonic acid gas, is expelled by the operation of fire, it becomes of the greatest service to the farmer especially, by assisting the progress of vegetation; which assistance, though seldom understood by the ignorant farmer, is performed by the action of its return to its former or original state, which commences immediately on its re-exposure to the influence of atmospherical air, from which it again imbibes what has been lost or expelled in the *kiln*; the reabsorption being more or less rapid according to the aspect

of the situation, and the nature of the soil upon which it is laid.

This remarkable property of lime, which is also possessed by some other mineral substances, is either not sufficiently known or attended to by those who are most nearly concerned with its use. The common saying of farmers, that certain fields, or parcels of land, *hold* this species of manure better than others; or, in other words, that they continue longer to be benefited by its application, originates in the effects of this property. The return of prepared lime to its original state, or its reabsorption of the fixed air which has been expelled, being accelerated or retarded according to the degree of moisture in the situation where it is placed, and its exposure to the solar heat. Thus, though burned lime is highly and very quickly beneficial in cold, wet, and mossy ground, by absorbing the redundant moisture of such a situation, and giving warmth, vigour, and nourishment to the plants with which it has contact; yet

its useful properties will there soon be lost, and it will become a burthen, instead of an improvement, to the soil.

It is on account of this property that *lime* should not be used as a manure for any long continuance on the same soil, without being mixed with other fertilizing substances. In some parts of the north, and north-western, parts of England, it is much used for grass land; and I am acquainted with several instances where it had the effect, by long use, of rendering very fertile land absolutely barren; by forming a hard, thick, impenetrable crust of indurated, stony, matter on the surface it was intended to fertilize; converting it, in fact, into a mass of real and genuine *lime-stone* incapable of affording nourishment to a single blade of grass.

In alluding to those continual changes and new combinations of matter which are every where taking place on the surface of this globe, and to which we, ourselves, are liable; my design has been rather to awaken or stimulate a spirit of inquiry into these mysterious and important subjects, which

so particularly belong to the province of the enlightened *Naturalist*, than to furnish any new or extraordinary facts from my own observation.—In this field of inquiry, which is unbounded, the most important results, to the happiness, knowledge, and best interests of mankind, may be obtained.

CHAP. XII.

Conclusion, and Recapitulation.

THE man who surveys the vast field of Nature with an eye of true philosophical inquiry ;—who devotes a portion of his time to the study of the principles which influence, or govern, the motions of animated beings, however minute they may be, will not only derive infinite pleasure from the pursuit ; but he will gain the only means of discovering the object and utility of their creation. And, as he journies along from one gradation of knowledge to another, he will become more and more intimate with the designs, and gain a more comprehensive view, of that wonderful and illimitable Power which hath organized the universe, for purposes with which, in the fulness of time, the wise and the virtuous will, doubtless, be made acquainted ; though it may

not be in this state of existence, lest the splendour and magnitude of that sight should be too much for mortal vision.

But knowledge must ever be progressive ; and he who makes no attempt to read the characters by which the wisdom, power, beneficence, and eternal nature of God is stamped upon every thing here below, which is equally apparent on the ground beneath our feet, as on the face of heaven spangled over with countless millions of stars, and in every object by which we are surrounded ;—he who makes no attempt of this interesting, this important nature, whilst yet in the morning of his existence, and whilst the power is still mercifully delegated to him ; cannot expect or hope for that increase of intelligence of light and joy, which will assuredly be the reward of those who have sought after the knowledge of God, *and his glorious works*, when the veil of mortality shall be rent, and the delighted spirit shall be led to the fountains of Omniscience, whose waters are eternal life and bliss.

I have thus attempted to express a few of my sentiments and views of the right use, and proper objects, of *Natural History*. If more leisure had been mine, something of the kind, more worthy of the public eye, might probably have been produced. But, such as it is, I present this little Essay to those who may be induced to peruse it; till something better shall appear, with a view of awakening new interests in the breasts of many who have never turned their thoughts to subjects of this nature. I am sensible that it is a poor epitome of what might be written on so noble a subject, which is ever varying, ever new, and full of the most seductive charms; but I could not persuade myself to destroy the papers containing the hints and remarks scattered through this little volume, because I think them, however hastily or imperfectly expressed, calculated to do good. On pursuits of this nature some of the happiest hours of my life have been employed; and, to be satisfied of their inno-

cence, and vast utility, requires little reflection.

One of my principal objects in the publication of this work, is the hope of being able to convince the *young Naturalist* that he ought to have higher views of his favourite science than the attainment of its nomenclature or language, which, indeed, is indispensably necessary; but, if he wishes to become an *accomplished Naturalist*, and any illustrious characters are to be named as models for his imitation, I should say, let him endeavour to unite the peculiar and opposite excellencies of LINNEUS and BUFFON in himself, and he will become a useful and distinguished ornament in the department of knowledge which he has chosen for the direction of his labours.

In recapitulation, I may once more observe, that it should be the business of the true Naturalist to study the works of GOD with a view, and an earnest desire, to understand *His* designs respecting them;—that he should endeavour to learn their

utility, both general and particular, rather than to make himself acquainted with their mere external character, their names, or the classes into which they appear naturally separated, though linked;—that he should regard all created beings as one vast family united together for some great end; over whom, so far as is practicable or beneficial, as lord of the whole, he should extend the offices of benevolence, rather than the spirit of persecution;—that in using, applying, or changing natural bodies for his own purposes, he should be careful to fulfil, rather than to counteract, the *will* of the GREAT FATHER and ARCHITECT of the UNIVERSE; so far, at least, as it can be *felt* or discovered: and, above all, that he should seek to know his own duties in the midst of that beautiful creation which, like a celestial garden, has been spread out for his footsteps, and given to him as an inheritance.

If the true lover of Nature attempts these things, he may indeed, at some future day of emancipation and of bliss, hope to have the

veil which now darkens his vision removed;
and to behold things as they really are.

“Heav’n’s King! whose face unveil’d consummates bliss;
Redundant bliss! which fills that mighty void
The whole creation leaves in human hearts!
Thou, who didst touch the lips of Jesse’s son,
Rapt in sweet contemplation of these fires,
And set his harp in concert with the spheres!
While of thy works material the supreme
I dare attempt, assist my daring song.
Loose me from earth’s enclosure, from the sun’s
Contracted circle set my heart at large;
Eliminate my spirit, give it range
Thro’ provinces of thought yet unexplor’d;
Teach me, by this stupendous scaffolding,
Creation’s golden steps, to climb to thee.”

THE END.



J. MOYES, PRINTER,
Greville Street, Hatten Garden, London.



